COMMERCIAL FISHERIES Review

VOL. 29, NO. 7

JULY 1967

DIV. OF FISHES

THE KENNEDY ROUND
Tariff Cuts on Fishery Products

UN REPORT
How to Avert World Protein Crisis

COVER: Whipping the bosom rollers aboard during bottom fish explorations on the BCF's research vessel "Silver Bay" off the coast of South Carolina. (Photo: J. B. Rivers)

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

FISHERMEN'S MEMORIAL--GLOUCESTER, MASS.

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The Bureau of Commercial Fisheries and The Bureau of Sport Fisheries and Wildlife make up The Fish and Wildlife Service of The United States Department of the Interior.

Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

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Use of funds for printing this publication was approved by the Director, Bureau of the Budget, May 1, 1963.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Price 60 cents (single copy). Subscription Price: $6.50 a year; $2 additional for foreign mailing.

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KENNEDY ROUND WINS THOUSANDS OF TARIFF CUTS

The United States joined 45 nations in signing at Geneva on June 30 agreements reached in the 3-year-long Kennedy Round of trade talks. Tariff cuts on industrial goods average about 35 percent; they are less on farm items.

Starting January 1, 1968, and ending January 1, 1973, the U. S. will reduce tariffs on about 6,000 items up to 50 percent--some immediately, but most will be put into effect in 5 equal stages. The effects of the concessions will be gradual--but in the end substantial. The American consumer is expected to benefit.

The U. S. will release in mid-July the tariff cuts made by foreign nations that will benefit American exporters.

The Kennedy Round was so named because it was made possible during the Kennedy administration by Congressional passage on October 4, 1962, of the Trade Expansion Act. This gave the President authority until June 30, 1967, to cut tariffs up to 50 percent--and, in certain cases, to eliminate them. President Kennedy signed the Act a week later. The rates of duty existing on July 1, 1962, were the basis for negotiation.

The trade talks were conducted under the General Agreement on Tariffs and Trade (GATT), a largely voluntary agreement that includes nations of widely different political views.

Negotiators Hail Results

U. S. negotiators called the Kennedy Round results "the most comprehensive assault on barriers to international trade that has ever taken place." Eric Wyndham White, director-general of GATT, stated: "Almost 50 countries, accounting for around 80 percent of world trade, have participated in the negotiations... trade in the products on which concessions have been agreed amounts to some $40 billion." About 60,000 items are involved.

Talks Produced Other Important Results

In addition to tariff concessions, the talks also resulted in a new international grains agreement raising the minimum world trading price for wheat. Other industrial nations will join the U. S. in supplying food to poor nations. A new "antidumping code" was adopted. And the negotiators agreed on "closer harmonization" of steel tariffs among major producing nations and concessions on chemicals.

U. S. Exports Greater Than Imports

The U. S. exports more than it imports, reports the Department of Commerce: in 1966, exports totaled $29 billion and imports $25.5 billion. Of U. S. imports, only 20 percent are consumer goods. Imports have remained for years about 3 percent of the Gross National Product (GNP), the sum of all goods and services rendered; in 1966, the GNP was $740 billion.

Based on 1966 imports, the U. S. is granting tariff concessions on about $7.5-8 billion of industrial and farm imports. The U. S. is gaining concessions from foreign nations on about an equal amount.

About one-third of U. S. imports are items not produced here, such as coffee. They enter free of duty.

The tariff cuts adopted cover the bulk of imports on which there are duties.

Listed below are major fishery imports affected by the tariff concessions. They were adapted from the new U. S. "Schedule 20" for Commercial Fisheries Review by Frank Riley, Supervisory Fishery Reporting Specialist, Branch of Fishery Statistics, BCF.

Description	Rates of Duty	
	As of July 1, 1962	Concession Rate (Final Stage)
Halibut and salmon	0.5¢ lb.	Free
Swordfish:		
Fresh	1¢ lb.	Free
Frozen	0.75¢ lb.	Free
Blocks (over 10 lbs.)	1¢ lb.	Free
Canned tuna in brine:		
Under quota	12.5% ad val.	6% ad val.
Excess of quota	25% ad val.	12.5% ad val.
Canned salmon:		
Not in oil	15% ad val.	7.5% ad val.
In oil	25.5% ad val.	12.5% ad val.
Fish sticks and similar products:		
Not cooked nor in oil	20% ad val.	10% ad val.
Other	30% ad val.	15% ad val.
Tuna loins and discs	1¢ lb.	0.5¢ lb.
Canned clams:		
Razor clams	7.5% ad val.	3.5% ad val.
Other	20% ad val.	14% ad val.
Canned crabmeat	22.5% ad val.	11% ad val.
Canned oysters:		
Smoked	4.5¢ lb.	2.2¢ lb.
Other	6¢ lb.	3¢ lb.
Juice	6¢ lb.	3¢ lb.
Pearls:		
Natural	3% ad val.	Free
Cultured	5% ad val.	2.5% ad val.

Note: "Ad val." is "Ad valorem," a percentage rate levied according to value of imported item.

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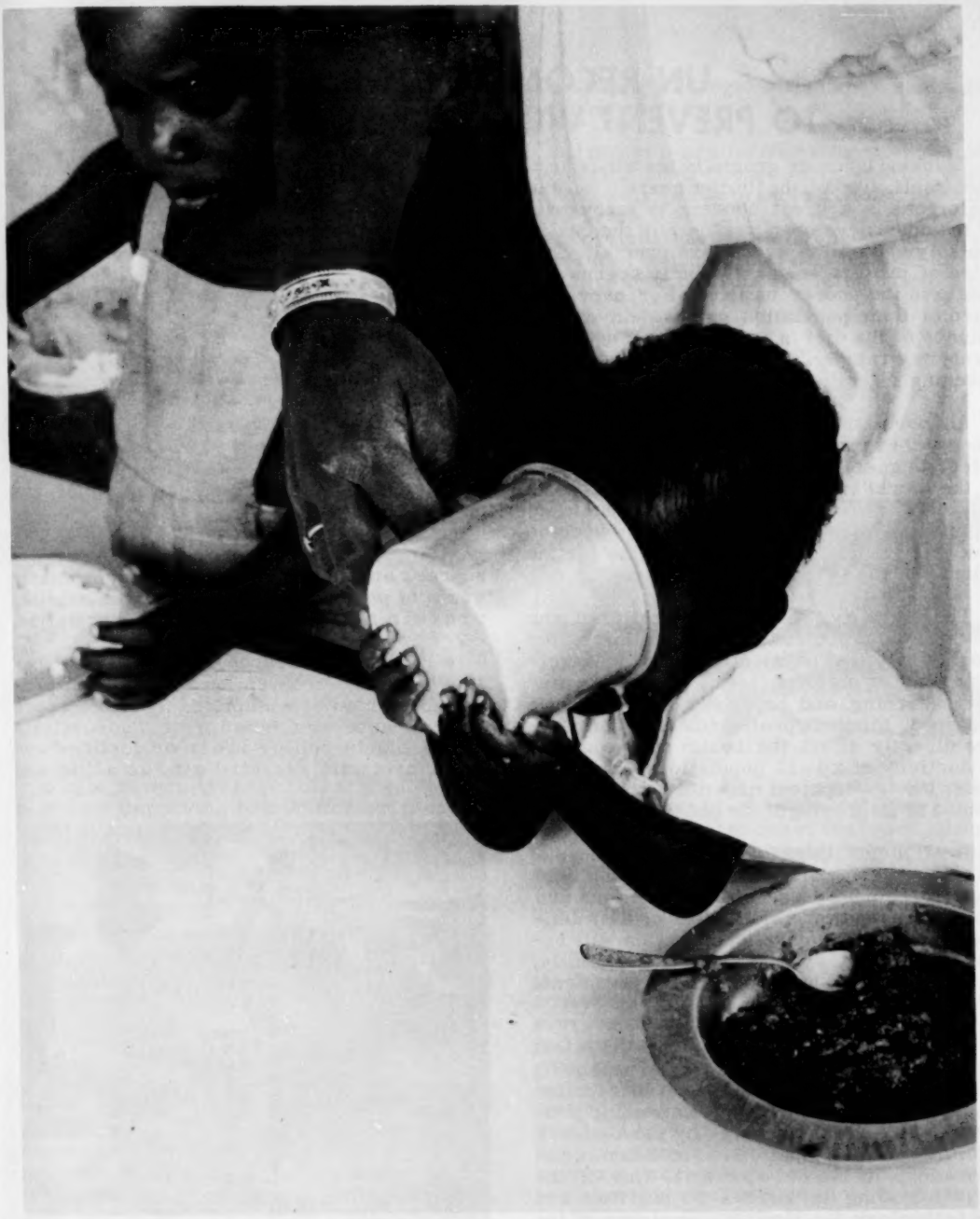


The dangerous age for Africa's children. Protein deficiency rarely is seen in infants at breast because human milk supplies enough protein. When breast feeding stops, it often means loss of life itself for many children.

Unaccustomed to adult food, which often is insufficient for adults, child slips into deficiency diseases. "Kwashiorkor," the most dangerous, causes retarded growth, discoloration of skin and hair, bloating, swollen belly, and mental apathy. In photo, UN worker extends a very helpful hand. (Photo: Paul Almasy/WHO)

UN RECOMMENDS PLAN TO PREVENT WORLD PROTEIN CRISIS

Mankind is losing ground in the struggle to feed itself. Today, the limited quantity of food (calories) is a great concern to many parts of the underdeveloped world--but the quality (notably protein) is even more crucial. Supplies of protein are particularly scarce and costly in the poorer nations. For over one-third of their population, the protein-calorie balance of the diet is inadequate. The gap is "widening rapidly." The protein problem is reaching a "critical stage."

As population increases faster than food supply, these nations are losing the capacity to feed themselves. They contain a large part of the world's population--and will have an even larger part of the future population. Supplying enough food to them has become "one of the most important problems for the balance of the twentieth century."

There are over 300 million children who lack sufficient protein and calories and suffer grossly retarded physical growth and development. For many of them, mental development, learning, and behavior also may be impaired. Further, protein-calorie deficiencies directly affect the health and economic productivity of adult populations--and thus hinder the development of nations desperately in need of improving their condition.

The United Nations family must act to close the gap between world protein needs and supplies--to help the present hungry millions and to prevent even more widespread protein deficiency in future generations. Action will require increased spending by the UN family, other institutions, and individual governments throughout the world.

This grim situation inspired the latest UN report on food: "Feeding the expanding world population: recommendations for international action to avert the impending protein crisis." It was prepared by the Advisory Committee on the Application of Science and Technology to Development. One of the world's leading authorities on nutrition and food technology, Dr. Nevin S. Scrimshaw of the Massachusetts Institute of Technology, was general adviser on protein to the committee.

The report recognizes that the "bulk of the funds and efforts needed to realize the policy objectives must come from outside the UN family, mainly from national governments."

It emphasizes that there is no single solution to the complex problem of providing great quantities of proteins of high biological value--in the form the consumer will accept, and at a price he can afford.

The report's program of action contains these key elements:

I. Supply

- Efforts must be intensified to improve production of conventional plant, animal, and fish sources of protein.

- Prevent waste. Mobilize all possible resources and efforts to reduce the preventable waste of protein. Make better use of existing protein resources for human consumption.

- Exploit new sources. Develop and produce new and unconventional sources of protein for human consumption: foods incorporating oil-seed meals, fish protein concentrate (FPC), single-cell protein or fortified cereals, synthetic essential amino acids, and others.

Fig. 1 - Red hake is dropped into grinder--producing, after water and fats are dissolved in alcohol, fish protein concentrate (FPC).

Fig. 2 - FPC fishburger.

To achieve improved use of these sources, "there must be greater emphasis on nutrition education, and in the processing, marketing and promotion of food products."

II. Consumption

• It is imperative to put much greater emphasis on improving distribution and marketing of protein foods.

III. Appropriate Research and Training Facilities

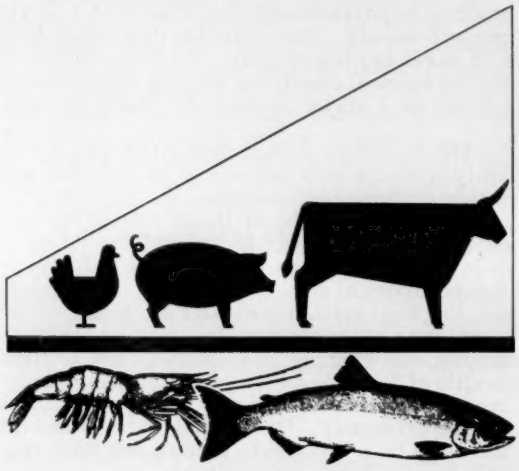
• They must be established to build or strengthen the necessary institutional framework--and to provide technical education and training for the manpower needed to deal with these problems.

The Advisory Committee recommends the creation of a protein-promotion trust fund to be administered by the UN Development Program. It urges strengthening of the coordination machinery within the UN family. It urges more cooperation between developed and developing nations, public and private sectors, and support from the highest political levels.

The Needy Areas Must Produce More

The committee believes that the crisis arising from the protein gap "can only be met or mitigated through rapid increases in food, primarily in the regions where the shortages are most acute."

All proteins are formed from amino acids in varying proportions. Only 8 amino acids are essential to human nutrition. Proteins are divided roughly into 2 classes: First-class proteins have a relative abundance of all 8 essential amino acids. Most proteins in this class are derived from animal sources: meat,



fish, eggs, milk. The value of second-class proteins is limited by the relative absence (seldom complete) of one of the essential amino acids: most vegetable proteins--for example, cereals, legumes.

TO CLOSE THE GAP

Because the largest volume of protein for the foreseeable future must come from the conventional plant, animal, and fishery resources, the report states, their production and conservation should receive first emphasis. This production depends on more highly skilled personnel, adoption of improved plant varieties and animal breeds, greater supply and effective use of mechanical equipment, rural credit, marketing and price supports, agricultural extension programs, assistance in eradicating animal diseases, and incentives to farmers.

The present scale of effort by developing nations and the aid given them by developed nations are "dangerously inadequate."

Livestock will be an increasingly important source of protein in the developing nations. There must be improved efficiency in producing milk and meat from cattle, meat from sheep and pigs, and eggs and meat from poultry throughout the world by applying existing knowledge and by introducing new knowledge.

FISHERY RESOURCES

Fresh and processed fish already are making important contributions to the world protein supply. For countries like Japan, they are essential to survival. The Soviet Union is one of several countries relying increasingly on fish as a major source of dietary protein.

The Advisory Committee gives high priority to the fishery resources of the seas and inland waters--conventional sources of protein. The utilization of these resources requires larger fishing fleets and facilities in developing countries, and suitable refrigeration facilities at the point of catch and throughout the distribution network. While other methods of conservation, such as salting, drying, and canning, may protect the protein quality of fish, the dominant factors in selecting a method are acceptability and price of fish to the consumer. Developing nations should intensify their efforts to catch more fish; this will involve large expenditures.

Fig. 3 - Inspecting algae oyster food at BCF's Oxford, Md., Laboratory.

Fishery industries should be set up or extended to exploit and distribute available sea, river, and lake resources by established procedures or by fish farming methods in natural or artificial ponds. Equally important is the development of distribution systems to ensure economic transport and storage of this highly perishable commodity. Different transport systems and conservation methods may be used in each area. Preservation techniques range from refrigeration, salting, drying, and canning to the production of fish pastes or sauces.

Fig. 4 - Checking sperm used in fertilizing female oysters at BCF's Oxford, Md., Laboratory.

Fig. 5 - Scientists of BCF's Oxford, Md., Laboratory inspect oysters planted in a Chesapeake Bay tributary.
(Photos this page: George Tames, The N. Y. Times)

At present, very large amounts of fish are dried and used to produce animal food in developed nations rather than for direct human use in developing nations, where a large part of this dried fish meal is produced. The usefulness of fish is even greater than the figures for potential production suggest because of the high biological value of this protein. The development of suitable transport and preservation procedures could result in diverting a large proportion of fishery products directly to human consumption. This need may become nutritionally desirable and economically important, if these fisheries are to survive. This is because advances in food technology in the developing nations may make it possible for them to produce more of their own animal protein foods without having to import and use dried fish meal. A large amount of fish by-products and fish unsuitable in the natural state can be converted into foods for human consumption.

PREVENTING WASTE

The unnecessary losses of protein foods in field, storage, transport, and home must be prevented. Loss to insects, birds, rodents, etc., and combined effects of high temperature and humidity may reach over 25 percent in many developing nations. There is urgent need for insecticides, rodenticides, modern storage facilities and practices, and more efficient distribution.

The report states: "Improved cereal-grain milling procedures would salvage considerable supplies of edible protein as well as calories . . . . There is a tremendous potential in the conservation of foods and their preservation in a wholesome state."

UNCONVENTIONAL SOURCES

But if the world is to have a fighting chance to meet future food needs, the food supply must be supplemented from unconventional sources. Some of the unconventional sources do not depend on the availability of farm land. "It is in the development of such sources that the application of modern science and technology can make the greatest additional contribution towards closing the protein gap."

From the unconventional sources, the Advisory Committee strongly recommends:

1. Promote the production and use of fish protein concentrate (FPC).
2. Increase direct food use by people of oil-seeds and oil-seed protein concentrates. "No other single source of unconventional protein could contribute so greatly and promptly towards closing the protein gap."

The committee says that the technology for carrying out these 2 recommendations is well advanced. But "the biggest difficulties lie on the consumption side. As with other protein sources, the acceptability for human consumption of oil-seed protein and FPC depends upon making them desirable as food because of their physical and other properties. People will not eat protein simply 'because it is good for them'. Millions of tons of good quality protein are presently available in oil-seed cake, and technology is fully developed for processing it to provide a low-cost, safe product of good biological value. But unless this product is made available in a palatable and desirable form, it will not be purchased or eaten. One of the areas of this whole problem requiring most urgent attention and effort is the development, promotion and marketing of protein foods which are desired by the consumer. Present efforts in these directions are pathetically inadequate."

FISH PROTEIN CONCENTRATE (FPC)

The Advisory committee says that the FPCs so far available have not yet proved sufficiently attractive to consumers when incorporated into human foods. The task of winning acceptability for FPC is of major importance, along with research to modify its properties by changing processing conditions during manufacture. Such an investment might yield new products with interesting properties that could improve the characteristics of staple foods.

The application of technical research to fish has provided a highly nutritious concentrate without any unpleasant odor. In all probability, research and development could determine ways in which FPC might offer positive advantages to the consumer when added to acceptable foods.

The committee recommends support for the production and marketing of acceptable FPC for human consumption in developing nations that have substantial marine resources. Several suitable processes are available, but their application will require adequate fishing fleets and processing facili-

ties, research in food technology to develop acceptable and desirable forms to suit local tastes--and market research to determine how the product should be introduced and promoted in local markets.

If acceptable food products containing FPC are promoted and consumed, ample private capital may become available.

Fig. 6 - All these foods contain FPC.

The report points out that FPC represents a stable form in which fish can be fed even to infants. It can be made from fish that are available in very large amounts and are not suitable for direct human consumption. Also, FPC is cheaper because it can be made from abundant fish which would otherwise not have a ready market except for animal feed or fertilizer.

For infants and young children, fish protein may be made by processing suitable fresh fish into FPC by extracting most of the oil, with or without later removal of flavor and odor. FPC contains about 80 percent protein. The cost of deodorized FPC, even calculated per pound of protein (20 to 30 cents) will be considerably higher than that of oil-seed protein (8 to 12 cents) and comparable with that of nonfat dry milk. While a product that retains a fish odor and taste can be produced more cheaply, marketing it is likely to be more difficult. Further, few developing nations have ocean-going fishing fleets or industry to produce FPC on a commercially practical scale. Some needy nations do not even have access to the sea.

Hurdles for FPC

The obstacles to a major contribution by FPC to developing nations are: (1) need for modern fishing industry to provide raw material; (2) construction and operation of plants to make a wholesome, acceptable product at low cost; (3) finding acceptable ways of using the product in foods; (4) marketing and promoting it.

Whether nations plan to produce FPC or not, if they have access to good fishing waters they can and should develop modern fleets. Fresh, dried, salted, smoked, and canned fish are valuable dietary protein sources. Programs to utilize fish need to be supplemented by production of FPC for human consumption.

OTHER RECOMMENDATIONS

The UN's Advisory Committee on the Application of Science and Technology to Development also recommended:

- Intensify research greatly on single-cell protein sources. "Research to develop feasible means of producing and utilizing on a large scale protein from single cells offers the best hope for major new protein supplies independent of agricultural land use." Its report states that some single cells can grow through utilization of inexpensive energy sources, such as hydrocarbons from petroleum, natural gas, or vegetable starch, and others may derive their energy through photosynthesis. Intensive research is needed on their nutritive value, safety, processing, and incorporation into wholesome and palatable foods for people. A variety of microbial, yeast, and algal species should be explored for possible use by animals and people.

- Support the use of synthetic amino acids or protein concentrates to improve nutritive value of cereal and other plant proteins, and develop the use of other synthetic nutrients. The protein value of world cereal supplies could be increased "tremendously" in a few years by adding small amounts of lysine to wheat, lysine and tryptophan to corn and sorghum, and methionine to some legume-based foods.

- Develop and support regional and national centers for research and training in agricultural technology, food science, food technology, and nutrition. Regional centers to serve a number of developing countries must be large enough to include the disciplines required to deal with the complex food and nutrition problems.

• Assist centers for the animal and clinical testing of new protein foods for developing nations.

• "Support training of personnel in the fields of marketing (including distribution and promotion), market research (including socio-cultural surveys of consumers), and systems analysis to assist the marketing and promotion of new protein foods."

• "Expand the number of fellowships for training in nutrition, food science and food technology, and other fields important to the production and consumption of protein foods."

• "Governments should review and improve their policies and their legislation and regulations regarding all aspects of food and protein production, processing, and marketing so as to remove unnecessary obstacles and encourage appropriate activities."

• Accelerate development and growing of genetically improved plants of high protein value and improved agronomic characteristics. At present, dramatically improved varieties of corn, rice, and cottonseed are available for immediate introduction into developing nations.

SALT CODFISH STILL HIGHLY FAVORED

The cod is one of the commonest fishes of northern waters and has been highly regarded by the French for several centuries (Escoffier, the internationally famous chef, thought it ranked "among the finest of fish"). It has been a staple food in Portugal, Spain, and Italy for almost as long, and has been glorified in Massachusetts (where the wooden Sacred Cod, in memory of the fish's considerable contribution to the economy of that State, hangs in the State House in Boston.

The cod brought prosperity to New England, as it had to France and the Scandinavian countries long before the New World was settled. Basque fishermen, in the sixteenth century, reached the Newfoundland Banks, site of the greatest codfishing grounds in the world, and brought back large quantities of cod, which the French soon learned to value. The Scandinavians had sailed to those banks earlier, and the Latins swarmed on them later. Cod thus became one of the most important of all food fishes. It was particularly known in its salted, dried state throughout most the Western world.

Salt cod is the basis for hundreds of epicurean preparations, ranging from the delectable "brandade de morue," one of the classics of French cuisine, to codfish balls, once a Sunday breakfast ritual in New England.

At one time, preparing salt cod was something of an ordeal. A housewife of the last century, getting up a codfish dinner, was advised "to lay the fish into the cellar a few days before it is to be cooked, that it may be softened by the dampness. The afternoon before it is to be boiled, wash it carefully in several waters. It is well to keep a brush on purpose to cleanse salt fish and use it repeatedly while it is soaking.

Nowadays, salt cod comes shredded or flaked in packages or wooden boxes, and needs only a brief soaking, if any at all, depending on how it has been processed. American recipes call for salt cod cut from whole salted fish, which is available in most fish markets, and can almost always be found in Spanish and Italian neighborhoods. The fish will require anywhere from 6 to 24 hours of fresh-water soaking, depending on how salty and dried it is. On Fridays, some fish stores sell salt cod already soaked and some of the Italian trade still buy their "bacala" in this manner. ("Gourmet")

UNITED STATES

Great Lakes Commercial Catch Is Up But Value Drops

The Great Lakes Commission reports that 116.2 million pounds of fish were taken from the Great Lakes in 1966 by U. S. and Canadian commercial operators. This is a gain of about 17.5 million pounds over 1965. However, the value of U. S. -Canadian catch declined from $10.8 million in 1965 to $10.2 million. The disparity between weight and value in U. S. catch resulted from a huge increase in the catch of low-value alewife in Lake Michigan waters. This gain obscured the overall decline in other species.

The Canadian situation was due principally to a decline in the market value of yellow perch, leader in Ontario's commercial catch.

The Great Lakes catch in 1965 and 1966, according to BCF and the Ontario Department of Lands and Forests, was (in 000's of pounds):

States	1966	1965
Illinois	80	180
Indiana	-	7
Michigan	21,284	19,748
Minnesota	1,685	1,613
New York	457	442
Ohio	10,516	11,528
Pennsylvania	573	514
Wisconsin	32,822	20,124
Total	67,417	54,156

Lake Basins	U. S. Waters		Canadian Waters	
	1966	1965	1966	1965
Ontario	237	217	1,645	2,647
Erie	12,698	13,524	41,424	35,096
St. Clair	-	-	940	886
Huron[1/]	3,769	4,673	2,913	3,568
Michigan	42,455	26,994	-	-
Superior	8,258	8,748	1,837	2,270
Total	67,417	54,156	48,759	44,467

1/Canadian waters include Georgian Bay and North Channel.
Note: Dollar value (in 000's): U. S. 1966 $5,647, 1965 $5,729; Ontario 1966 $4,564, 1965 $5,112. Ontario 1966 figures are preliminary.

Lake Michigan's Production Higher

In 1966, Lake Michigan increased its leading position in the U. S. Great Lakes commercial catch. This resulted primarily from an increase of 107 percent in alewife landings--from 14 to 29 million pounds. Lake Michigan landings accounted for nearly two-thirds (63%) of the U. S. Lakes total in weight (see table), while the $2,762,000 value was 49 percent of the total for the Lakes states. The Lake Michigan alewife catch was 43 percent of the total U. S. Great Lakes catch and 7.7 percent of the value.

Last year, about 20.3 million pounds of the alewife netted were used to produce fish meal and oil; 8.7 million pounds were used by the pet food industry.

This concentration of alewife landings from Lake Michigan does not reflect the overall abundance of this species in Great Lakes waters. Rather, it indicates where commercial fishermen are utilizing this resource. A BCF survey in fall 1966 discovered large quantities of alewives in lakes Erie and Ontario but, to date, this has not prompted any commercial fishing operation there.

Chub Is Lake Michigan's Most Valuable

Another prominent species in the Lake Michigan commercial catch, and most valuable, is the chub. The larger chubs, smoked for retail market, accounted for 6.3 million pounds of 1966's 7 million total; they were worth nearly $1.4 million. The smaller fish were used in pet foods.

Among other important Lake Michigan species, notable changes occurred in the commercial catch of yellow perch and whitefish. For yellow perch, there was a sharp drop from 5.8 million pounds in 1964 to 1.3 million in 1965, and to an all-time low of 636,000 pounds in 1966. A significant cause has been competition for food from the flourishing alewife; the result has been that the yellow perch has been hampered in its growth to a marketable size.

The whitefish catch presents a bright outlook. The 1966 landings of this high-value fish were over 1.4 million pounds, compared to about 1 million pounds in 1965, and the highest amount since 1952.

Erie Is Most Productive

Lake Erie, the most productive of the Great Lakes for commercial fishing, yielded over 54 million pounds in 1966. The catch in Ontario waters represented about three-quarters of Erie's total--and 85 percent of the total weight of Canadian Great Lakes landings. Yellow perch was the leading species. Increased catches in both U. S.

and Canadian waters amounting to 4.1 and 20.7 million pounds, respectively. Smelt, which ranks second in the Lake Erie commercial catch, is taken almost entirely by Canadian fishermen. The 1966 Canadian harvest reached 15.9 million pounds, compared to 11.7 million in 1965. More suitable trawling grounds on the north shore is a major factor for this localization.

In the Lake Huron area, including Georgian Bay, the 1966 catch of 6.7 million pounds was a decline from 1965 for both U. S. and Canadian sections of the lake basin. Among the leading commercial species--chubs, yellow perch, whitefish and walleyes--only yellow perch landings in the Saginaw Bay area increased.

U. S. Took 4/5 of Lake Superior Catch

In Lake Superior, U. S. commercial fishermen accounted for about four-fifths of 1966's total landings of 10.1 million pounds. This was nearly a million pounds below 1965, but the $1.4 million value was slightly above 1965. The prominent position of lake herring in the total Lake Superior catch is shown by last year's U. S.-Canadian commercial landings of 5.6 million pounds, lowest for this species and also for the lake's total catch since the early 1920's. Lake trout landings in U. S. and Canadian waters totaled a quarter-million pounds in 1966, about the same as 1965. This was due to the control of commercial operations during the rehabitation period for this fishery.

The commercial catch in Lake Ontario is predominantly in Canadian waters. Last year's decline of a million pounds from 1965 was due in large measure to the sharp decrease in landings of yellow and white perch. In Lake St. Clair, commercial fishing operations are carried on only in Canadian waters. Here, modest increases were made in 1966 in the catch of walleyes and carp, the principal species.

Sea Lamprey Control in Lake Superior May Be 94-97% Effective

In early April, electrical barriers to assess the abundance of spawning lampreys in Lake Superior were installed on 16 streams on the U. S. side. By June 2, 997 lampreys had been captured at these barriers. This was about 45 percent of the number taken by June 2, 1966--then the smallest run recorded since chemical control began to show its effects on the lamprey population.

Based on the timing of lamprey migration during the past 10 years, from 37 to 64 percent of the run had appeared at the barriers by June 2. Assuming 1967's run will fall within this range, the season's total will be somewhere between 1,550 and 2,700 lampreys. Such a population range would be 94 to 97 percent below the annual average for the 5-year period prior to chemical control.

The U. S. and Canada share the work of the Great Lakes Fishery Commission in lamprey control. The Bureau of Commercial Fisheries conducts the U. S. operation.

Lake Michigan Alewife Fishery Is Active

The Lake Michigan alewife fishery was in full swing during May and total production was estimated at over 10 million lbs. by month's end. Heaviest production was from pound nets and trawlers at Milwaukee, and from trawlers at Two Rivers, Wisc.

Four converted gillnetters at Two Rivers each landed consistently about 40,000 lbs. per day, and several 60,000 to 85,000 lb. days were achieved by vessels making 2 or 3 trips. Meal plants at Milwaukee, Pensaukee, and Menominee were running 8 to 16 hours per day. Green Bay poundnetters set nets for full production by mid-June.

U. S. Urges Removal of 90% of Pollutants in a N. Y.-N. J. Area

Interior Department's Federal Water Pollution Control Administration (FWPCA) recommended in mid-May that 90 percent of the major pollutants of waters in the Raritan Bay area between Staten Island, N. Y., and New Jersey be removed by building municipal and industrial waste-treatment plants.

The recommendation was one of several made public at a 2-day conference in New York City on pollution of Raritan Bay and neighboring interstate waters. The meeting, called by FWPCA, was attended by more than 150 New York and New Jersey officials and industrialists.

A FWPCA study has shown that high bacterial counts made shellfish in most of Raritan Bay unfit for human consumption--and swimming at some Staten Island beaches a health hazard. New York and New Jersey have banned the harvesting of shellfish.

Suggests Timetable

FWPCA suggested agreement on a timetable to complete designs for treatment works by the end of 1967, construction to begin no later than mid-1968, and operations to start in mid-1970.

The bay area and Arthur Kill between Staten Island and New Jersey was described as "virtually a cesspool". The cost of cleaning the mess was estimated at a half-billion dollars.

Pollution was attributed to municipal and industrial waste being discharged into the bay, at the southwest tip of Staten Island, and along the New Jersey shore. Waste also is fed in from the Raritan River, which empties into the upper bay from New Jersey.

The Federal Water Pollution Control Act authorizes Federal financial support for the States' anti-pollution programs, but Congress must approve specific appropriations.

OCEANOGRAPHY

Core Drilling Begins On Continental Slope Off Atlantic Coast

The Department of the Interior approved plans for Humble Oil and Refining Company to carry out a core-drilling program on the Continental Slope beyond the Continental Shelf off Florida and northward to points off Cape Cod and Georges Bank. The program, scheduled to be completed this summer, is gathering geologic data beyond the 100-fathom curve. It features the first drill probes of the Slope by a private company.

Robert E. Speer, U. S. Geological Survey's Oil and Gas Supervisor for the eastern region, said that "about 21 core holes will be drilled beneath the floor of the Atlantic Ocean in water ranging in depth from 650 feet to 5,000 feet." He added that "the depth of sediment penetration in each core test will be limited to a maximum of 1,000 feet. The drilling operation which, hopefully, will recover sediment cores from beneath the sea floor thick enough to provide a useful stratigraphic 'profile' will begin about July 1, and will probably last through the summer months."

Speer noted that the core holes continue the type of industry studies carried on in the Gulf of Mexico for the past two years.

Special Equipment Involved

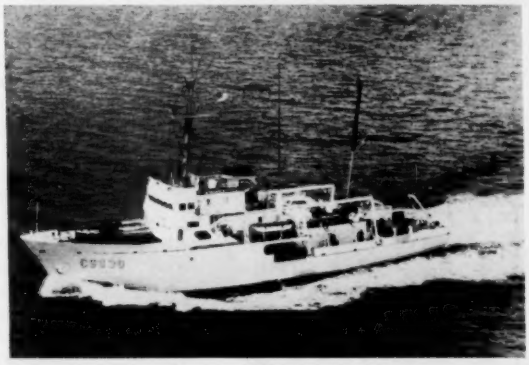
The drilling is conducted from a specially equipped vessel. In addition, a geophysical survey is being made using a "sparker" technique, which involves measuring acoustical waves from the vessel to the rock formations below the sea flood, and back to the vessel. This method obtains clues to the configuration of the rock strata.

Also, a shipborne gravity meter and magnetometer are supporting the core-drilling program. These devices measure variations in gravitational and magnetic properties of rocks. By making contour lines of such variations on a map, geologists learn about the nature of subsurface rocks.

Speer noted that the approval granted to Humble to drill core holes is not exclusive. Other interested parties are invited to request approval for similar programs. "No rights to any mineral leases will be obtained from these core drilling programs," he said.

New Survey Vessel Leaves for Honolulu Base

The new $2.4 million hydrographic survey ship of the Coast and Geodetic Survey, the USC&GSS "McArthur," left Norfolk, Va., on May 30 for Honolulu, her future home port. The ship is scheduled to reach her destination July 8 after a 40-day, 8,300-mile trip via the Panama Canal. She will be the first Survey ship in 35 years to make Honolulu her permanent home base.



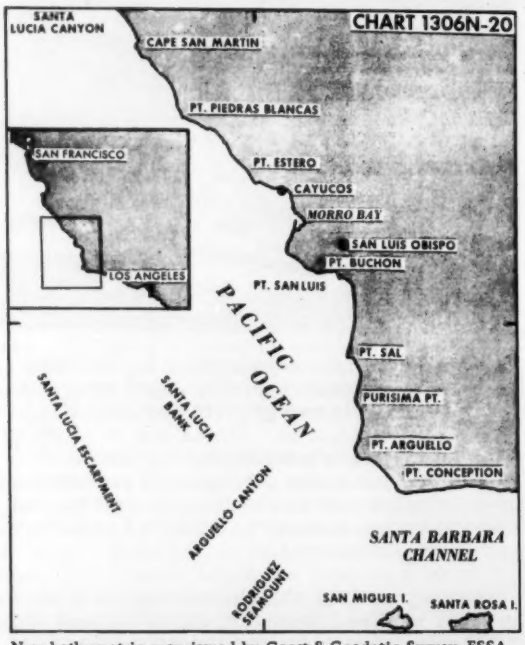
The McArthur, constructed in Norfolk, carries 37 officers and crew, and has been engaged in cable and gravity surveys off Florida's East Coast. She is one of 15 ships in the Coast and Geodetic Survey fleet. The fleet conducts ocean surveys and research, hydrographic surveys of coastal waters, and investigations of underwater navigational hazards.

During her trip, the ship conducted oceanographic studies, including exploration of the sea bed's topography and investigation of the sea's temperature, salt content, and magnetic force. After leaving Kingston, the McArthur gathered more information on the Explorer Bank, a submerged mountain discovered in 1960 by the USC&GSS "Explorer" southeast of Swan Island off Central America.

In addition to hydrographic surveys, the McArthur can carry out sophisticated oceanographic investigations. She is expected to advance hydrographic and oceanographic research of importance to Hawaii's economic growth by hydrographic and current surveys, magnetic and gravity observations, and general oceanographic research.

New Map Shows California Sea Bed

The Coast and Geodetic Survey has published a detailed map of the sea bottom off the California coast about midway between Los Angeles and San Francisco. The bathymetric map, which covers about 10,000 square miles, embraces an area extending seaward up to 75 nautical miles--from Cape San Martin in the North to east of Point Conception and Santa Rosa Island in the South.



New bathymetric map issued by Coast & Geodetic Survey-ESSA covers seabottom off California coast in areas shown above.

The map is the second in a series of topographic maps of the sea bottom that will cover the entire west coast. The first map was issued in February and covered the area immediately south to Huntington Beach, Calif. Similar maps are being made off the Gulf and Atlantic coasts.

Maps Needed for Exploration

The maps are designed to aid Federal, State, and industrial interests explore and develop the potentially vast resources of the Continental Shelf in and under the ocean. Their economic development depends heavily on bottom topographic maps; few exist now. Knowledge of the sea bottom is essential to marine engineering, scientific studies in recovering offshore oil and minerals, and to evaluate shoreline addition and erosion.

In the new map, the sea floor is shown in detail by depth contours for the first time. The depths range from a few feet off the coast to 13,300 feet at the most seaward point. The map is a compilation of surveying activities that began back in the 1930s. Underwater features include the western portion of Santa Barbara Basin; Rodriguez Seamount; Arguello Canyon; and Santa Lucia Bank, Canyon, and Escarpment. Also included are the offshore islands of San Miguel and part of Santa Rosa.

The map, designated 1306-20, may be bought for 50 cents from the Coast and Geodetic Survey (attn: C44), Washington Science Center, Rockville, Md. 20852, or from chart distribution centers of the Coast and Geodetic Survey at 121 Customhouse, San Francisco, Calif. 94126, and 602 Federal Office Bldg., 90 Church St., New York, N. Y. 10007.

Sharks Repelled by Plastic Bag

U. S. Navy researchers have found that men in shark-infested waters are protected from attack by a 5-foot-long, water-filled, plastic bag. The bag is held up at its open upper end by an inflatable ring. The man, supported by a life jacket, floats inside the bag, apparently screened from the senses of cruising sharks. Tests have shown that several types of sharks ignore the bag. Some sharks even went out of their way to avoid the bag. (From "Sea Secrets," May 1967, published by The International Oceanographic Foundation.)

Foreign Fishing Off U. S. Coasts, May 1967

IN NORTHWEST ATLANTIC

Soviet: Weekly sightings showed that the Soviet fleet increased rapidly from 140 fishing and support vessels early in May to about 200 vessels by month's end, mostly by the arrival of 50-60 medium side trawlers (SRT). The SRT class made up almost three-fourths of fleet.

During May, 171 vessels (exclusive of duplication) were sighted and identified: 18 factory stern trawlers, 10 large refrigerated side trawlers, 30 medium refrigerated side trawlers, 98 medium side trawlers, 5 factory base ships, 9 refrigerated fish transports and cargo vessels, and one tug. This is considerably more than the 140 vessels sighted during April 1967 and the 125 of May 1966.

Throughout May, the fleet was divided into large groups dispersed for 200 miles along the 50- and 100-fathom curves, from about 75 miles south of Block Island, Rhode Island (Block Canyon) to 100 miles east of Nantucket Lightship (Lydonia Canyon) off the Massachusetts coast. Smaller groups operated intermittently on northeast slopes of Georges Bank and off New Jersey coast.

In early May, most of the fleet (140 vessels--mostly side trawlers) remained between Block Canyon and south of Nantucket Lightship. Moderate catches of fish on deck appeared to be mainly whiting and red hake. Some evidence of herring catches was observed on isolated vessels (SRTM's) in more shallow waters far from main fleet.

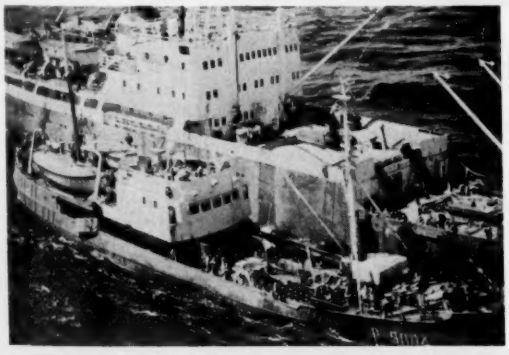


Fig. 1 - Large catches of red hake are temporarily heaped in open storage areas aboard Soviet refrigerated fish carrier servicing fleet south of Block Island (Rhode Island) in Northwest Atlantic. The smaller vessel, medium refrigerated side trawler "Kurzeme--9084," caught the fish and delivered them to carrier. (Photo: C. L. Philbrook)

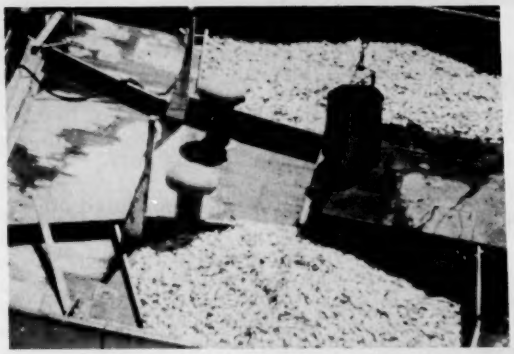


Fig. 2 - A close-up of the open storage areas aboard unidentified vessel with large catch of red hake. The huge bucket on hatch is used to hoist fish from catching vessels. (Photo: C. L. Philbrook)

Fish were heaped in open storage areas on board the transports and processing ships (see photos 1 and 2), indicating good average landings.

By mid-month the main fleet had gradually shifted to more shallow depths (30-40 fathoms) covering a 60-mile area from 45 miles south of Block Island to 40 miles south of Nantucket Island. Moderate catches appeared to be mostly herring (alewife or river herring) and some whiting. It is believed that Soviet research vessels have located lucrative stocks of these fish during their spring migration inshore to rivers and streams. A temporary decline in abundance of whiting and red hake may have prompted this move. This is the first time a large Soviet fleet fished for river herring so far north; in March 1966, a river herring fishery developed off Virginia's coasts.

By month's end, the fleet expanded in number of vessels and areas. Vessels between Block Canyon and south of Nantucket Island were taking mostly whiting, red hake, and some herring; on Georges Bank, vessels were fishing for herring and some haddock.

OFF MID-ATLANTIC COASTS

Soviet: Virginia fishermen from Hampton reported 30-40 Soviet vessels taking large quantities of herring (probably alewives), mackerel, and small scup (porgies) off Maryland and south New Jersey coasts.

Soviet fishing off mid-Atlantic coasts has been sporadic in 1967. In 1966, 30-60 vessels consistently fished this area from March to mid-May.

IN THE GULF OF MEXICO

Soviet: No fishing vessels were sighted close to U. S. shores. A few continued fishing on Campeche Bank off Mexico, but most vessels were sighted in transit to or from Havana Bay, site of new fishing port.

Cuban: No fishing vessels operated off U. S. coasts. However, many were scattered throughout Caribbean. Fishing in Gulf of Mexico was limited to traditional grounds on Campeche Bank, but only a few vessels were sighted. The fleet seemed concentrated off Cuba's northern coasts (over 20 vessels) and north of Bahamas. Early in May, a few fished north and northeast of Grand Bahama Island. Throughout May, this fleet increased by month's end, at least 25 were fishing north of Great Abaco Island; apparently on high seas beyond limits of Little Bahama Bank's submarine shelf.

OFF CALIFORNIA

Soviet: The fleet fluctuated from a few in mid-month to about 15 at end. Ten large stern factory trawlers sighted in last week of April suddenly left for fisheries off Pacific Northwest. By May 10, only 1 stern trawler was fishing off California near Oregon border. Within one week, however, the same vessel moved farther south, others arrived; by May 22-25, at least 12 large stern trawlers again were fishing off California accompanied by research vessel of Pacific Institute for Fisheries and Oceanography (probably on exploratory research mission).

The fleets fished mainly Pacific rockfishes and hake. Little information is available on amounts landed, but they could be substantial. Some leading stern trawlers were catching an estimated 60-70 metric tons a day.

OFF PACIFIC NORTHWEST

Soviet: Fishing and support vessels off Oregon and Washington exceeded 100 units for most of May. Weekly sightings revealed fleet increased rapidly from about 60 vessels at the end of April to 106 by May 4. For rest of May, the number fluctuated between 100 and 110 units.

In May 1966, the number off Pacific Northwest did not exceed 45 units. This indicates that Soviet effort in hake fishery this year is more than double last year's at this time. In 1966, number increased until July when over 100 units were operating. There are Soviet plans to increase catch of Pacific hake to about 200,000 metric tons in 1967 (53 percent above 1966's 130,000 tons) and it is likely that fishing effort will increase proportionately.

Most vessels were identified as medium side trawlers of various types including a few research trawlers. Large stern factory trawlers were less than 10 percent of all Soviet vessels (see table). The capacity of a stern trawler, however, is much greater than medium trawler's; on average, a factory stern trawler will land 5 to 6 times as many fish.

Soviet Fishery Vessels Operating Off Pacific Northwest in May 1967

Week of	Type of Vessel			
	Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Total
May 4	71	4	29	104
11	73	9	32	114
19	64	5	29	98
25	71	9	25	105
31	61	6	23	90

Through first 3 weeks of May, almost all vessels fished off Oregon, mostly between Heceta Head and Yaquina Head, but at times as far north as mouth of Columbia River, and as far south as Cape Blanco on Oregon's southern edge.

In last week, the fleet split and about 40 vessels began fishing off Washington, scattered from Cape Disappointment to Grays Harbor seaward of area restricted to Pacific ocean perch fishing (under 1967 U.S. - USSR Pacific Northwest Fishing Agreement).

A few vessels fished in areas off Pacific Northwest restricted under the 1967 Agreement. When captains were confronted with this fact by U. S. Coast Guard officials, their vessels departed promptly. U. S. State Department officials promptly notified Soviet Embassy in Washington, D. C., of these events.

Principal species fished was hake. The fleets had good-to-excellent catches early in May but dwindled towards month's end.

Early in May, BCF Resource Management Agents observed 10 Soviet vessels complete

hauls averaging about 8,000 pounds of hake per haul (moderate fishing). During second week, the largest catch observed per haul was 40,000-60,000 pounds (excellent fishing) but a few days later the best catch haul was estimated at about 20,000 pounds. Hauls yielding no fish were also observed. During last two weeks, catches ranged from poor to fair. The vessels were scattered, apparently searching for better grounds; 4-5 exploratory research vessels supported fleet during May.

Pair trawling was being used more often than last year when, apparently, it was on average the most successful technique. Pacific ocean perch and other rockfishes were occasionally observed aboard the vessels, apparently incidental catches.

No salmon were seen on board vessels or in catches.

Japanese: One stern trawler was reported in May northwest of Strait of Juan de Fuca, off coast of Washington, but well outside the U. S. 12-mile fisheries zone. It was not fishing.

OFF ALASKA

Soviet: The number of vessels increased from over 40 units in early May to about 85 units during mid-month; it decreased to about 65 units in late May. The mid-month increase was mainly due to the arrival of 3 whaling fleets, and the decrease at month's end was caused by departure of Gulf of Alaska shrimp fleet.

During May, the number of fleets increased along Aleutian Islands, while vessels withdrew from Gulf of Alaska.

During May, an average of 70 vessels operated off Alaska's coasts, compared with 158 vessels in May 1966. The number was so much smaller because large-scale Soviet fishing began one month earlier this year and many vessels that normally fish off Alaska in May shifted to fishing grounds off Washington and Oregon.

The number fishing for perch in Gulf of Alaska began to decline in late April, continued into May, and ended by mid-month.

Along Aleutian Islands, the perch fishing effort also decreased in late April but trend was reversed in early May. At first vessels were concentrated south and north of the Fox Islands but, during second week, this area was also abandoned and fishing (7 vessels) switched to central Aleutians. A few days later, another small fleet began a perch fishery in western Aleutians along Tahoma Reef. By month's end, about 30 vessels were fishing along Aleutians, about half in western Aleutians. Catches were reportedly good but data are inadequate for estimate.

The shrimp fleet of 1 factoryship and 7 medium freezer trawlers fishing on Portlock Bank east of Afognak Island was joined in early May by 6 medium trawlers. In late May, the entire fleet departed. Last year, the Soviet's Gulf shrimp fishery displayed a similar pattern; it was terminated by mid-June. Apparently, the shrimp move inshore during summer months and are no longer available outside U. S. 12-mile fishing limit.

The eastern Bering Sea king crab fishery was continued by 3 factoryships, 9 net-setting trawlers, and 2 exploratory trawlers. Operations were conducted generally northeast of Amak Island, where crabs migrate during early summer months. When a BCF agent boarded one crab factoryship, in late April, he was advised that Soviets would continue fishing until late June, the pattern during recent years.

Whaling operations off Alaska began this year in mid-May. One fleet was sighted off western Aleutians and another south of central Aleutians. Each fleet is believed to consist of a factoryship and about 9 killer vessels. Lack of sightings of these fleets in late May indicates they remained well offshore, as in previous years.

Japanese: About 140 vessels fished off Alaska during first 2 weeks in May. With arrival of high-seas salmon and whaling fleets, number increased to about 450 for remainder of May.

In early May, the perch fishery in Gulf of Alaska was continued by 2 trawlers off Southeastern Alaska, 1 trawler off Fairweather grounds, 3 trawlers southwest of Middleton Island, and 1 trawler on Albatross Bank. By mid-May, 2 additional trawlers had joined Gulf of Alaska perch fleet with 7 trawlers operating on Albatross Bank, 1 southwest of Middleton Island, and 1 on the Fairweather grounds. In late May, the number in the Gulf

decreased to 6, when 2 vessels transferred to the perch fishery in eastern Aleutians and 1 presumably returned to Japan. Of the 6 remaining trawlers, 4 were on Albatross Bank, 1 on Portlock Bank, and 1 off Middleton Island.

During second week, the Japanese renewed perch fishery south of Fox Islands in eastern Aleutians with arrival of 1 factory trawler. In late May, she was joined by 2 factory trawlers from Gulf of Alaska.

Perch operations in eastern Bering Sea were continued by 1 factory trawler during first week along the 100-fathom curve south of Pribilof Islands. By mid-month, there were 3 factory trawlers in eastern Bering Sea along 100-fathom curve north and south of Pribilofs.

In early May, 1 factoryship accompanied by 12 trawlers was reported along 100-fathom curve well northwest of Pribilof Islands in central Bering Sea. It is believed this fleet was involved in perch operations and continued fishing through May.

The Alaska pollock fishery north of Fox Islands in eastern Aleutians was continued by 4 factoryships accompanied by 85-90 trawlers during first 3 weeks of May. In late May, those fleets moved northward to Bristol Bay "flats" and, presumably, began fishing for flatfish rather than Alaska pollock.

During first week, the Eastern Bering Sea king crab fishery on Bristol Bay "flats" was continued by 2 factoryships, each accompanied by 5 net-setting trawlers. During second week, one fleet shifted to Pribilof Islands area, the custom for several years. The fleets remained split--1 in Pribilof area and 1 on Bristol Bay "flats"--for remainder of May.

After 2 years of limited experimental pot fishing for king crab in eastern Bering Sea, the first commercial-scale pot fishery was initiated in early May. The trawlers "Tenryu Maru" and "Chiyo Maru No. 15" (reportedly to fish 740 pots) began operating in "pot sanctuary" area north of Unimak Island amid similar gear of several U. S. vessels. King crab catches are reportedly being frozen (both ships have freezing facilities). Operations continued through May and, despite continuing rumors of U. S. gear losses caused by this fishery, no documentation has been received.

Japanese sources reported that 3 whaling fleets (same as past several years) were scheduled to depart Japan between May 12-15 for the 1967 North Pacific whaling expedition. Generally, each whaling factoryship is accompanied by 8 to 12 whale killer vessels and about 3 support vessels. Within third week of May, one fleet was reported north of central Aleutians. It is believed the other 2 fleets were also operating along Aleutian chain, presumably well offshore (the pattern of the last few years).

Ships of the 1967 high-seas salmon fishery departed Japan about mid-month. By late May, at least 8 of the 11 fleets were operating south of western Aleutians, generally between latitudes 48° and 51° N. and longitudes 169° and 176° E.

Japanese long-line vessels fishing for sablefish were active in Gulf of Alaska and along central and western Aleutians through May. Two to 3 long-liners fished off Southeastern Alaska coast during first 3 weeks. During late May, operations were shifted into central Gulf, when 2 vessels fished off Middleton Island and 2 west of Chirikof Island. Two long-liners fished for sablefish off western Aleutians during first half of May. By month's end, they were joined by a long-liner; operations were extended to central Aleutians.

STATES

Alaska

THE ART OF FORECASTING RED SALMON RUNS

The Bristol Bay area of southwestern Alaska is the world's largest producer of red salmon, states BCF Juneau, and processors and fishermen must have a reasonable forecast of the run to Bristol Bay to plan their activities: boats, fishing gear, and canning lines must be readied; fishermen and cannery employes flown to Bristol Bay and arrangements made for housing and for supplies. If preparations are inadequate for the run, part of it will be wasted; if the run is smaller than expected, there will be an overinvestment in labor and material. These considerations are important for all salmon fisheries--but especially so for Bristol Bay: it is isolated, has a short but extremely intensive fishing season, and it has a great year-to-year fluctuation in run size. So attempts to develop accurate predictions have been concentrated on Bristol Bay runs.

Since 1960, biologists of BCF, the Alaska Department of Fish and Game, and the Fisheries Research Institute of the University of Washington have worked together to forecast the red salmon runs in Bristol Bay. They have used several types of relationships to prepare these forecasts. The number of adults that escape the fishery to spawn in their natal stream can be related to the number of their offspring that will return to the fishery in later years. These escapement-return relationships provide forecasts for individual river systems. Relationships between young salmon migrating to sea from their nursery lakes (called out-migrant smolts) and returning adults also provide individual river systems forecasts. Forecasts of 3-winters-at-sea fish can be made using data on returns of 2-winters-at-sea fish from previous years.

Bristol Bay Forecasts

Table 1 shows the Bristol Bay forecasts and the actual runs observed since 1960. Although predictions are more accurate for Bristol Bay red salmon than for other Alaskan red salmon runs, they are far from perfect. Total returns over a period of years from a given escapement or seaward migration of smolts can be forecast with fair accuracy, but forecasts of returns in specific years are less accurate. This is because Bristol Bay red salmon mature after 2 or 3 winters at sea, with the proportion returning after 2 winters varying from 20 to 80 percent. Other sources of error include: variable ocean survival rates (from 5 to 30 percent); inaccurate indices of smolt abundance; and an inaccurate high seas index of immature salmon abundance. Efforts to improve the accuracy of forecasting Bristol Bay red salmon runs concentrate on: (1) continued research on causes of salmon mortality in the ocean; (2) research on factors related to the adult maturation process; (3) continued refinement of the mathematical techniques used; and (4) improvement of sampling techniques used in determining population sizes of smolts and immature salmon.

Table 1 - Total Bristol Bay Runs and Forecasts of the Run, 1960-66

Year	Total Run	Forecast	Deviation
	(Millions of Fish)		Percent
1960	42.6	35.0	-17.8
1961	26.3	27.0	+ 2.6
1962	12.3	9.7	-21.1
1963	8.6	15.6	+81.4
1964	13.4	17.7	+32.1
1965	64.0	27.8	-56.6
1966	22.0	33.0	+50.0
Average absolute deviation			+34.4

An accurate forecast has a very large economic value. A recent study by Stephan B. Mathews at the University of Washington demonstrates that a forecast of the run with a margin of error (difference between forecast and actual return) of $\pm$ 100 percent of the actual return saves the industry about $500,000 in preseason investment. Since present forecasts near this level of accuracy cost about $250,000 per year to prepare, the forecast is worthwhile on this basis alone.

Also, the forecast is valuable as a basis for regulating the fishery so that each tributary receives the desired number of spawners. The forecast of 1967 Bristol Bay red salmon to each tributary is shown in table 2. In some streams, so few red salmon are expected that no catch can be allowed, while others can stand a catch of over 60 percent of the total run.

Table 2 - Bristol Bay Red Salmon Forecast, 1967

River System	Prediction	Escapement Goal	Estimated Harvest	Percent Harvest
Kvichak	3,993,000	3,500,000	493,000	12
Branch	810,000	300,000	510,000	63
Naknek	2,564,000	1,000,000	1,564,000	61
Total Naknek-Kvichak	7,367,000	4,800,000	2,567,000	35
Egegik	2,381,000	1,000,000	1,381,000	58
Ugashik	933,000	850,000	83,000	9
Togiak	180,000	100,000	80,000	44
Igushik	153,000	153,000	0	0
Snake	77,000	77,000	0	0
Nuyakuk	128,000	128,000	0	0
Wood	2,484,000	1,100,000	1,384,000	56
Nushagak/ Mulchatna	46,000	40,000	6,000	13
Total Nushagak	2,888,000	1,498,000	1,390,000	48
Total Bristol Bay	13,749,000	8,248,000	5,501,000	40

FORECASTING PINK SALMON RUNS

Since 1960, the Alaska Department of Fish and Game has expanded its work on forecast research at a rapid pace. Egg and fry sampling techniques are continually being refined. Fairly accurate forecasts of pink salmon to Prince William Sound have been made since 1962. In 1964, predictions were made for Kodiak, outer Cook Inlet, and Southeastern Alaska. Annual forecasts are now being released for all 4 areas (table). Accuracy of the forecasts is less reliable, however, for the pink salmon runs in Kodiak, Cook Inlet, and Southeastern Alaska than it is for Prince William Sound because the history of forecasting for these areas is too limited.

The techniques used to predict what long was regarded as an "unpredictable species" depends upon estimating juvenile abundance while the populations are still in the stream gravels during early spring months. Near the end of the freshwater life, some 15 months before the return as adults, pre-emergent fry are excavated with hydraulic pumps from randomly selected plots in key spawning streams. The resultant fry index is related to adult return using observed ratios from past years. This gives forecasts sufficiently early to allow planning of industry operations and management regulations.

The pre-emergent fry system of pink salmon forecast depends upon stable marine survival rates. To date, lack of such stability has not been an important factor in accuracy of forecasts. Thus, mortalities during spawning, fall floods, and winter incubation set the stage for brood year success in Alaska. However, recent research in southern and central British Columbia has pointed to relatively major differences in early sea life survival from year to year. Both the Department of Fish and Game and BCF have continued studies of the early sea life of pink salmon in Southeastern Alaska to establish its impact on the overall survival of Alaskan pink salmon.

The following forecasts for 1967 were released by the Department of Fish and Game to the Alaska fishing industry:

Forecasts of Alaskan Pink Salmon Runs, 1967

Fishing Area	Approximate Range of Total Run[1]	Rating
	Millions	
Kodiak	2.0-4.0	Very poor
Cook Inlet	0.4-0.6	Very poor
Prince William Sound	2.5-4.1	Very poor
Northern Southeastern Alaska	4.9	Fair
Southern Southeastern Alaska	4.2-5.4	Fair

1/Catch plus escapement.

The prospects for 1967 are not good in any major pink salmon fishery. Low estimates reflect exceedingly poor survival conditions that existed throughout Alaska's southern coast during winter 1965-1966. The Alaska Board of Fish and Game already has adopted severely restrictive regulations for the Kodiak, Cook Inlet, and Prince William Sound 1967 seasons.

Methods of predicting pink salmon accurately are still in a primitive stage. BCF is experimenting with methods other than the State's.

Migration of Juvenile Salmon

Juvenile salmon migrate into the Gulf of Alaska each summer from important salmon producing areas from Washington to Alaska. The young salmon leave the coastal waters and immediately enter the northward moving Alaska stream that flows along the Alaska Continental Shelf. Fish within this relatively narrow band are completely mixed and the various races of salmon cannot be easily identified. Since many commercial salmon fisheries along the coast depend on fish originating in particular streams or from small local areas, accurate forecasts must be based on sampling the abundance of young salmon before they become mixed in the Gulf of Alaska--but as late as possible before this mixing occurs. Forecasts based on abundance of pink salmon during this seaward migration

could be more accurate than those now being made based on stream sampling. Therefore, BCF is learning the migration routes of juvenile pink salmon and measuring the environmental factors that affect these routes from each area in Southeast Alaska.

Migrations of juvenile salmon seem to correspond to surface ocean currents. As the knowledge of surface currents improves, researchers may be able to determine changes from year to year and forecast migration routes of salmon. Surface currents near shore may contain traces of "home-stream" water that could provide cues for adult salmon returning to spawn.

California

REPORTS PELAGIC FISH CATCH

The May report of the Resources Agency of California contains the following breakdown of the pelagic fish catch:

Species	May		January 1-May 31		
	1967 1/	1966	1967 1/	1966	10 Yr. Mean 1956-1965
	(Landings in Tons)				
Anchovy	7	176	28,160	17,537	3,799
Mackerel, jack	2,425	4,929	9,193	9,296	12,536
Mackerel, Pacific	8	178	122	559	5,028
Sardines	6	71	61	150	1,468
Squid	879	734	3,457	3,073	2,568
Total	3,325	6,088	40,993	30,615	25,399

1/Estimated. Accumulated landings are revised monthly.

Louisiana

SHRIMP SEASON STARTS WELL

The "inside" shrimp season in Louisiana waters, which runs from May 15-July 15, was off to a very good start. Dr. Ted Ford of the State's Department of Wildlife and Fisheries said large runs were being reported throughout Louisiana waters, the largest shrimp nursery in the U. S.

"Inside" waters are inside lakes, bayous, and inlets along the State's shoreline or nursery area. Here shrimp grow an inch every 10 days.

Dr. Ford predicted that the 1967 runs would make for a bountiful year. He emphasized that the shrimp caught early in the season were brown shrimp. The season on white shrimp runs from the third week in August to December 20. White shrimp are much larger than brown and are the profit margin for fishermen, Dr. Ford said. There is no size limit on brown shrimp, but for white it is no smaller than 68 to the pound.

BCF Specialist Agrees

George Snow of BCF confirmed Dr. Ford's optimistic view. In May, Louisiana fishermen marketed 9 million pounds of brown shrimp, heads-off weight. The best year in the past decade was 1963, when 4.9 million pounds were marketed in May.

While Louisiana's shrimp production is the largest in the continental U. S., Snow added, more shrimp are marketed in Texas. The Texas catch is off Mexico and in part of the Sabine River area west of Louisiana. In 1966, Texas marketed 43.8 million pounds, Louisiana 39.6.

Maine

STATE WILL TEST POLLUTION AS POSSIBLE AID TO LOBSTER INDUSTRY

Maine is expected to receive a $90,000 grant from the Federal Water Pollution Control Administration to find out if pollution can help the state's troubled lobster industry.

The first phase of the unusual experiments will involve use of "thermal pollution"--heated water discharged from the Central Maine Power Co. plant on Yarmouth's Cousins Island.

Later phases would include use of treated sewage from Yarmouth as food for lobsters.

Robert L. Dow, director of marine research for the Maine Department of Sea and Shore Fisheries, said the experiments would be the Nation's first in lobster farming and in the "positive use" of thermal pollution. He said the recent decline in the Maine lobster catch has a direct correlation with water temperature in the Gulf of Maine.

"According to scientists, there will be 20 more years of low temperatures in the present cycle," Dow said. "The warmer the water, the better the lobsters grow. Having a source of heated water to experiment with lobster cultivation is marvelous."

To Build Reef

The two-year first phase of the Cousins Island project will consist of building an artificial reef and experiments with mixing warm water and sea water.

The artificial reef will be built of stone, pieces of ledge, and concrete blocks to provide "apartments" and a natural habitat for the lobsters. SCUBA-diving students from Southern Maine Vocational Institute and members of the Rural Youth Corps may be used to build reef.

Later phases of the program would include experiments with plastic capsules on the ocean floor to protect lobster populations from their natural enemies, and the use of treated sewage from nearby Yarmouth as food for lobsters.

The plastic capsules would have attached hoses supplying heated water to protect young lobsters from natural enemies.

Ronald W. Green, commissioner of Sea and Shore Fisheries, said his department was "excited about the proposal."

He noted that his department has been interested in warming sea water for lobster growth since the evaluation of the defunct Passamaquoddy tidal power study proved its feasibility.

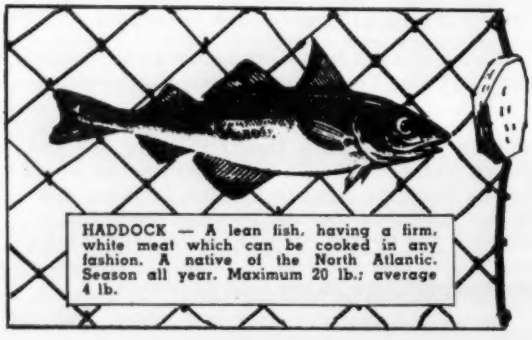
Successful completion of the project could "increase the value of commercial fisheries in Maine," Green added. He said his department would work closely with BCF at Boothbay Harbor.

Washington

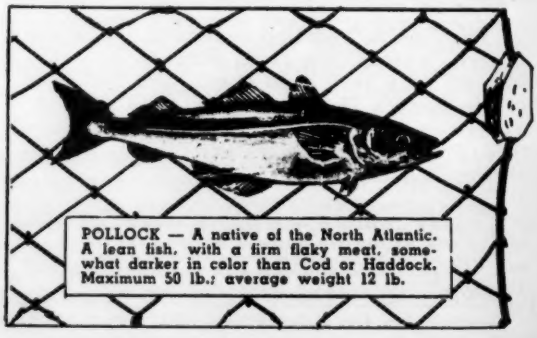
PACIFIC HAKE FISHERY STARTS WELL

Hake were becoming more available in the fishery off Washington State. By June 1, 17 trips yielding 549 tons, at ex-vessel value of $8,784,, were landed at the Aberdeen plant. The rapidly improving picture was evidenced by the fact that almost 60 percent of total landings of 549 tons were taken by the last trip of the "Baron," "Recruit," "Junior," and "St. Michael."

Best fishing has been in relatively shallow water well within the newly established U. S. 12-mile fishing zone. Based on previous years' experience it is expected that as season progresses some of the fish will move northward along the Washington coast and into deeper water. Considerable protection will be afforded U. S. fishermen by the 12-mile fishing zone, and by agreement with the Soviet Union. The latter's vessels will stay seaward of the 60-fathom bottom depth contour line between the Columbia River and Grays Harbor.



HADDOCK — A lean fish, having a firm, white meat which can be cooked in any fashion. A native of the North Atlantic. Season all year. Maximum 20 lb.; average 4 lb.



POLLOCK — A native of the North Atlantic. A lean fish, with a firm flaky meat, somewhat darker in color than Cod or Haddock. Maximum 50 lb.; average weight 12 lb.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

North Pacific Fishery Investigations

WINTER SALMON DISTRIBUTION AND OCEANOGRAPHIC CONDITIONS STUDIED BY "KELEZ" SCIENTISTS

The Seattle-based BCF research vessel "George B. Kelez" returned to home port on March 27, 1967, after a 9-week cruise in the northeastern Pacific Ocean. It was the Seattle Biological Laboratory's sixth annual winter cruise. The main objective was to study the winter distribution and abundance of salmon in relation to major oceanographic features--especially the Alaskan Stream and the Alaskan Gyre. The information gained on the cruise will be used to develop the laboratory's Bristol Bay forecasting program.

Fishing and oceanographic stations were located along two tracks: south of Cold Bay, Alaska, along long. 162° W., from lat. 54° to 46°05' N. (Jan. 30-Feb. 18) and south from Kodiak Island, along long. 155° W. from lat. 55°18' to 46°50' N. (March 4-22). Fishing stations were at about 50-mile intervals during the southbound trip along both lines and extended beyond the southern range of salmon distribution; stations were established at intermediate points on the return north on the basis of the oceanographic data. The sequence was altered on the western track due to an unusually severe storm and generally unfavorable weather. Nevertheless, 15 sets were made along long. 162° W. and 16 along long. 155° W. Oceanographic stations were located at each fishing station and at intermediate points.

The gill-net string was $1\frac{3}{4}$ miles long and consisted of 32 nets (6 each of $2\frac{1}{4}$- and 2-inch mesh, and 5 each of $5\frac{1}{4}$-, $4\frac{1}{2}$-, $3\frac{7}{8}$-, and $3\frac{1}{4}$-inch mesh, stretched measure). Nets were set between 1930 and 2200 hours and hauled about 0800 the following day.

Salmon Abundance

Catches were relatively small on both legs of the cruise. The combined catch of 765 salmonids was composed of 631 sockeye, 58 chum, 1 pink, 69 coho, and 2 chinook salmon, and 4 steelhead trout. Salmon were taken south of the Alaska Peninsula to about lat. 47° N. along both cruise tracks.

An obvious difference in the north to south distribution of age .1 (1-winter-at-sea) and age .2 and .3 (2- and 3-winters-at-sea) sockeye salmon was apparent from the catches (fig. 1). The younger fish were more abundant south of lat. 50° N. along long. 162° W. and were exclusively from stations south of lat. 50° N. along long. 155° W., whereas the older sockeye salmon were distributed rather uniformly. Although sockeye salmon were widely distributed from the Alaska Peninsula to about lat. 47° N. on both tracks, the other species were found exclusively south of lat. 50° N. Coho salmon were most abundant at lat. 47°30' N. on long. 162° W. and chum salmon at lat. 47°57' N. on long. 155° W.

Oceanographic Conditions

A new electronic instrument enabled the oceanographers to collect more and better data and permitted quick interpretation of changes in water characteristics aboard ship. With the Hytech 1/ model 9006 [salinity, temperature, depth system (STD)], we obtained continuous profiles of temperature and salinity to depths of 1,500 m. at 41 locations on and between the fishing stations (fig. 2). Other operations included 28 Nansen bottle casts and 116 BT's. The principal currents and zones with discrete temperature and salinity characteristics are shown schematically in figure 3.

The major current systems in this area are the Alaskan Stream, which flows westward just south of the Alaska Peninsula and the Aleutian Islands, and the Subarctic Current, which flows eastward near lat. 47° and 48° N. The Alaskan Gyre is the boundary area of relatively weak flow between these two major current systems. A zone of cold water--the Oyashio Extension--is distinguished by temperatures below 3.6° C. between 300 and 400 m.; this cold water drifts slowly eastward from the western North Pacific between 50° N. and the main axis of the Subarctic Current. Horizontal mixing at depth complicated the temperature structure between the Oyashio Extension and the Alaskan Gyre. Oceanographic features varied in extent and detail along each track, but showed east-west continuity. Similarly, the distribution of age groups and species of salmon was consistent along both longitudes.

1/Trade names referred to do not imply BCF endorsement of commercial products.

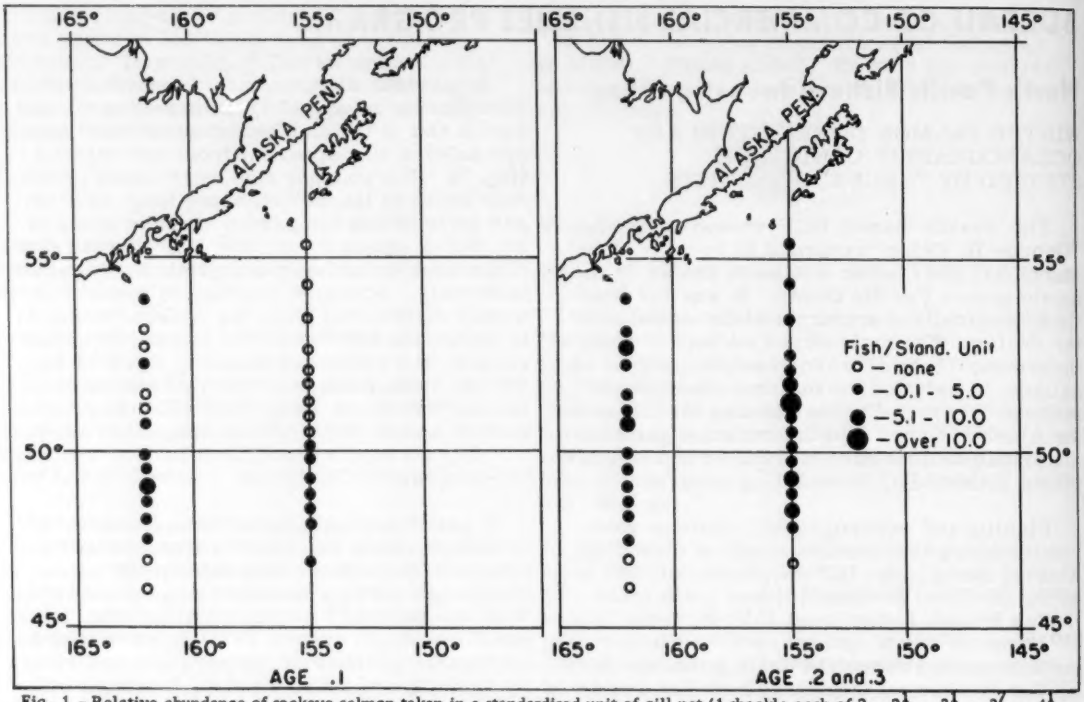


Fig. 1 - Relative abundance of sockeye salmon taken in a standardized unit of gill net (1 shackle each of 2-, $2\frac{1}{2}$ -, $3\frac{1}{4}$ -, $3\frac{7}{8}$ -, $4\frac{1}{2}$ -, and $5\frac{1}{4}$ -inch mesh nets) by R/V George B. Kelez, January 30-March 22, 1967.

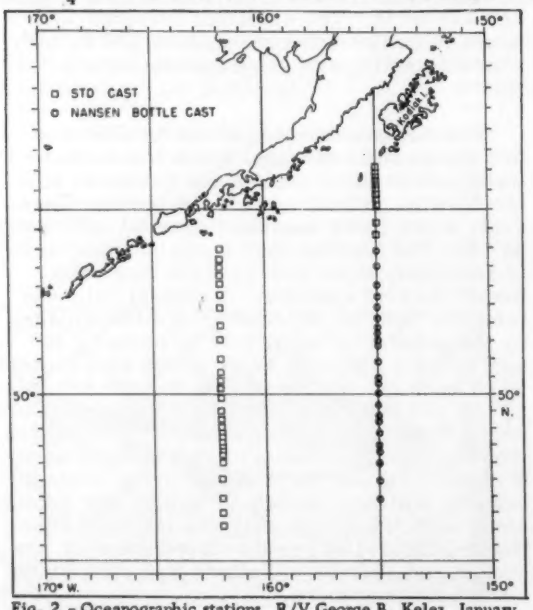


Fig. 2 - Oceanographic stations, R/V George B. Kelez, January 30-March 22, 1967.

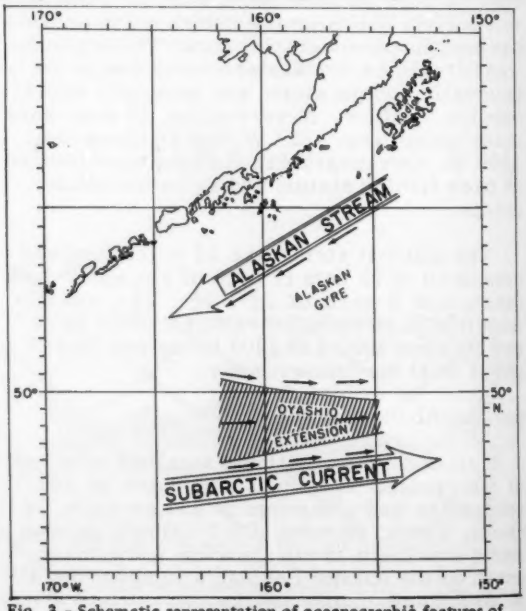


Fig. 3 - Schematic representation of oceanographic features of North Pacific Ocean, January 30-March 22, 1967.

A comparison of 1967 data with oceanographic conditions along long. 155° W. during the winter of 1962 (the only other year with comparable data) indicated less flow for both current systems in 1967. During 1962, much more (and slightly warmer) water flowed westward in the Alaskan Stream; its main axis was then about 75 miles farther offshore. Also, greater eastward flow in 1962 was suggested from the wider, lower temperature core of the Oyashio Extension.

Present oceanographic conditions (fig. 3) were compared with fish catches (fig. 1). The older (age .2 and .3) sockeye salmon were uniformly distributed north to south across the major oceanographic features, but the southern limit of the species was the axis of the Subarctic Current. Nearly all of the younger (age .1) sockeye salmon were in the Oyashio Extension-Subarctic Current area; other salmon species were only in the Subarctic-Current area. These data suggest, therefore, a preference during the winter of certain age groups or species of salmon for ocean areas with a unique environment.

--By Donovan R. Craddock, Fishery Biologist, and W. James Ingraham Jr., Oceanographer, BCF Biological Laboratory, Seattle, Wash. 98102

"Cromwell" Tests Midwater Trawl Successfully

A new midwater trawl was tested successfully on May 10-14 from the research vessel "Townsend Cromwell" of BCF's Biological Laboratory in Honolulu, reports John C. Marr, Area Director.

The purpose of the test was to evaluate the performance of the new net. In the crystal-clear blue water off Oahu's leeward coast, scuba divers could easily see the net traveling through the water with a perfect configuration. Small pelagic fish swam ahead of the net, maintained a speed (about 2 knots) equal to the net's for a time, then lagged behind--and eventually ended up inside the $\frac{1}{4}$-inch mesh bag at the end of the net. In addition to capturing over 300 juvenile opelu (Decapturus pinnulatus) in one tow, 6 juvenile skipjack tuna (Katsuwonus pelamis) were taken in all 7 experimental tows.

Results Unexpected and Encouraging

These results were encouraging but unexpected, says Bruce E. Higgins, Fishery Biologist with the Laboratory's Tuna Ecology Program. The peak spawning season for skipjack does not start until July in Hawaiian waters. Moreover, most trial tows were made just beneath the surface during daylight hours when the fish, particularly small skipjack, might be expected to avoid capture. The fact that they did not attests the collecting efficiency of the new net, which opens up to 40 feet in diameter and is 145 feet long. Small mesh netting ($\frac{3}{4}$-inch stretched mesh) makes up the main part of the net, so that once a fish is inside, escape is difficult.

The new trawl was designed by Richard L. McNeely, Chief, Gear Research Unit, BCF Exploratory Fishing and Gear Research Base, Seattle, Wash. McNeely and his colleagues use their nets to catch anchovy and other pelagic fish. They predict continued success for the nets in collecting juvenile tunas.

Higgins plans to use the new midwater trawl in intensive investigation of the distribution of skipjack and other tunas in space and time in Hawaiian waters during July, August, and September 1967. He hopes to devise techniques for collecting juvenile tunas with the trawl that will have widespread application. If he achieves this, it will assist in solving problems of identifying larval tunas--and delineating spawning areas of various racial groups of adult skipjack caught in central and eastern Pacific fisheries.

A Vessel and Sled Pursue the Precious "Nehu"

The June 1967 issue of Commercial Fisheries Review reported the efforts of BCF's Honolulu-based "Gilbert" to study the behavior of the "nehu." This $1\frac{1}{2}$ to 3-inch long silver anchovy is the major local bait for skipjack (or aku), the State of Hawaii's largest commercial fishing industry.

Following are some photos taken on the Gilbert's 100th cruise.

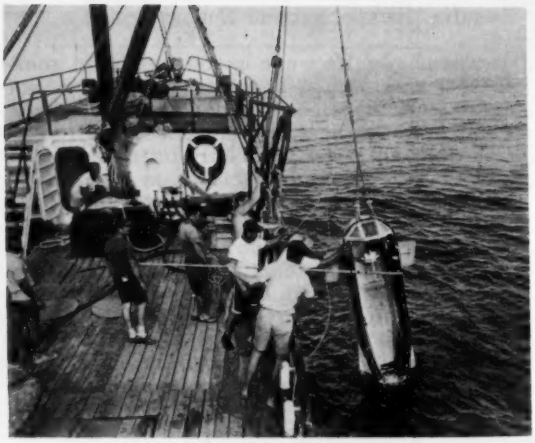


Fig. 1 - Sea sled lowered into Hawaiian waters.

Fig. 2 - Scuba diver jumps into water to board sled rigged for towing.

Fig. 3 - J. J. Naughton, BCF Honolulu Laboratory's diving supervisor, and R. M. Gooding, Fishery Biologist, get set to go sledding.

Fig. 4 - Ocean is scientists' vastest laboratory.
(All photos except fig. 6: Warren R. Roll, Honolulu Star-Bulletin.)

Fig. 5 - This tiny silver fish--nehu--feeds Hawaiian tuna industry. It is the bait.

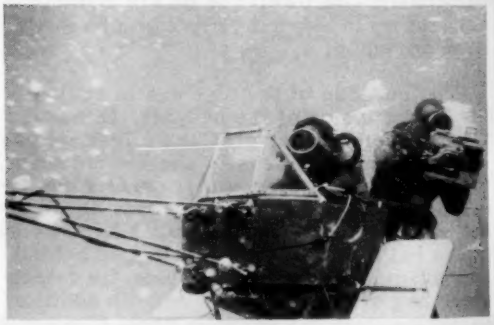


Fig. 6 - Camera used under water in photo by scuba diver.
(Photo: J. J. Naughton, BCF.)

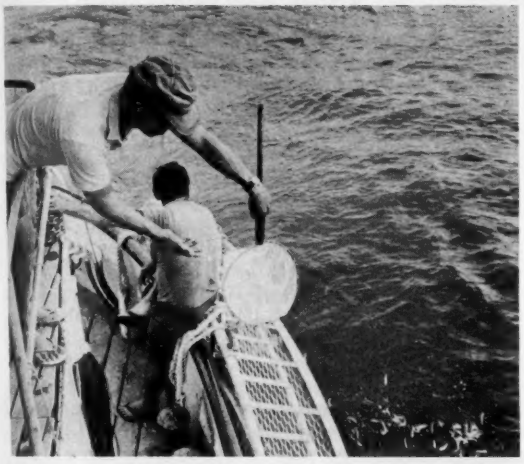


Fig. 7 - Nehu tossed into water, where sled waits to see what they do. (Photo: Warren R. Roll, Honolulu Star-Bulletin)

"Gilbert" Studies Hawaii Swordfish Potential

BCF's Honolulu-based Charles H. Gilbert returned to Kewalo Basin after a month-long cruise in Hawaiian waters, reports John C. Marr, Hawaii Area Director.

Its primary mission was to determine whether the catch rates of broadbill swordfish (Xiphias gladius) by longline fishing in Hawaiian waters could be increased substantially by fishing at night. Presently, the Hawaiian longline or flagline boats catch only a small number of swordfishes annually. Bigger catches of swordfishes could help to revive the flagging local longline fishery. Director Marr says this fish is considered a delicacy in many places.

A night longline fishery for broadbill swordfish has been based for some time in Japan. Off the New England coast, where there is a harpoon fishery for swordfish, BCF's Gloucester Laboratory reported that swordfish were caught by longlines in greater quantities at night.

Gear Drifted With Currents

The Gilbert used fishing gear similar to gear being used regularly by the local longline fleet. The gear was set about an hour before sundown, allowed to drift all night with the currents, and hauled in the next morning after sunrise. In contrast, the local boats usually set and retrieve their gear during daylight hours.

Six swordfish totaling over half a ton were caught in 22 fishing operations off Waianae, Oahu, and Hilo, Hawaii. The largest weighed 448 pounds and measured over 10 feet from the tip of its snout to its tail. The catch rates at night were somewhat better than those made by the local longline boats during the day. But, judged on the basis of this single cruise, the rates were not high enough to form the basis of a fishery.

"Cobb" Finds Hake But No Anchovy

BCF's John N. Cobb returned to Seattle on June 2 after a 19-day exploratory survey for hake and northern anchovy in continental shelf waters off the Washington-Oregon coasts (Cruise No. 87).

The cruise's primary objectives were to: (1) determine distribution, relative abundance, and dimensions of hake schools in areas not being surveyed and fished by commercial vessels; (2) determine relative density of these schools by sampling with the BCF Universal trawl; (3) inform commercial vessels of hake concentrations; (4) continue testing the efficiency of the BCF Universal trawl, particularly its efficiency in capturing fish located on bottom; (5) collect hake and anchovy samples for various biological studies being conducted by the Exploratory Fishing Unit and the Biological Laboratory.

The Methods Used

Standard echo sounding survey methods, supplemented by sonar ranging, were used to locate hake schools. Onshore-offshore transects were run at oblique angles to the coast. The searching effort was confined principally to the area between the 15 and 100 fathom isobaths. The coastal area between Cape Flat-

tery, Washington, and Heceta Head, Oregon, was surveyed, but relatively little time was spent inside 50 fathoms in the area between Grays Harbor and the Columbia River. As many as 8 commercial hake vessels were working in this area during the survey period.

A BCF Universal trawl (2½-inch mesh), which is constructed to fish both on and off bottom, was the only net used. It was equipped with a ½-inch mesh liner in the codend and was fished with aluminum hydrofoil doors. A dual electrical depth telemetry system was used to determine net (footrope) and door depths.

A random sample of hake was processed from each haul to determine size (fork length) and sex composition. Samples of hake were also collected for stomach analysis. Blood was extracted from one sample of hake for use in a racial study being conducted by the Biological Laboratory.

Found Hake But No Anchovy

No anchovy schools were located. Significant concentrations of hake were not found except between Grays Harbor and the Columbia River inside of 50 fathoms. This area was cursorily surveyed on May 19 and 20, when 4 commercial hake vessels were fishing. Scattered schools of hake were being harvested, but the catch per unit of effort was low. About a week later, the catch rates of commercial vessels increased sharply; by June 1, roughly 1,600,000 pounds of hake had been harvested.

Two hauls were made in the Grays Harbor-Columbia River area. A one-hour haul was made along the bottom on moderate-to-heavy patches of anchovy-smelt-like sign, located southwest of the mouth of Grays Harbor at 49 fathoms. This yielded 1950 pounds of whitebait smelt (Allosmerus elongatus), and 50 pounds of miscellaneous species. A 10-minute bottom haul, at 18 fathoms off Peacock Spit at the mouth of the Columbia, caught 150 pounds of hake for blood samples. Moderate-to-heavy fish sign (hake mixed with anchovy-smelt sign) was observed, but excessive tidal currents prevented effective fishing.

Considerable anchovy-smelt-like sign was seen in the Grays Harbor-to-Columbia River area but apparently consisted of smelt only. With the exception of .5 pound of anchovy in the haul off Peacock Spit, no anchovies were caught.

Small concentrations of hake sign were observed near the 100-fathom contour at the tip of the canyon off Willapa Bay, off Cape Lookout, Oregon, at 55-58 fathoms, and on Heceta Bank between the 40 and 55 fathom contours. Two hauls were made on Heceta Bank, and one on the sign off Cape Lookout.

What It Caught

Off Cape Lookout, a 1½-hour haul on light-to-moderate sign on bottom, along the 57 fathom contour, yielded 5500 pounds of hake, 130 pounds of yellowtail rockfish (Sebastodes flavidus), 150 pounds of flatfish, mainly Dover sole (Microstomus pacificus) and rex sole (Glyptocephalus zachirus), and 35 pounds of miscellaneous species. On Heceta Bank, Oregon, two 1-hour hauls, one on bottom at 54 fathoms, and one 1-fathom off the bottom at 46 fathoms, were made. In the first haul, during which sign was observed on the echo sounder for less than 5 minutes, 4500 pounds of hake were caught, plus 115 pounds of sole, mainly rex sole, and 60 pounds of miscellaneous species. In the haul one fathom off bottom, 150 pounds of hake and 10 pounds of rex sole were taken. No sign was observed during the haul.

Throughout the cruise, the main purpose in making hauls was to test the BCF Universal trawl. Very little significant fish sign was observed, so evaluation of its species composition and density was of secondary importance. The trawl appeared to fish effectively on bottom with the doors off bottom. The footrope chain was noticeably shined after each drag, and various flatfish and permanently benthic (dwelling on sea bottom) invertebrates were caught consistently. An example of the net's ability to catch hake close to the bottom and not visible on the echo sounder was provided by the on-bottom haul on Heceta Bank. The towing resistance of the Universal trawl, compared to the Cobb pelagic trawl, could not be evaluated effectively. Only a few hauls were made and these at different depths and different tidal conditions (the latter often severe).

Judgment of the fishing capabilities of the Universal trawl, compared to various Cobb models, cannot be made--until either controlled comparative fishing experiments are conducted, or until experience now being obtained by commercial vessels can be evaluated.

"Kaho" Conducts LASER Fish Detecting Study

BCF fishing gear research specialists aboard the Kaho completed the initial phase of a LASER fish detecting study in Lake Michigan off Saugatuck, Michigan, during May 8 - 12 (Cruise 40). (LASER means light amplification by stimulated emission of radiation.) The investigation was made in cooperation with BCF, Seattle, Washington, and Lear Seigler, Inc., Ann Arbor, Michigan.

This study is part of BCF efforts to update systems used by commercial fishing industry and research agencies in marine and inland waters to detect and measure concentrations of fish. The successful development of such a system would allow high-speed scanning of large areas from aircraft or satellite because a LASER beam can penetrate the air-water interface. Sound or radio signals do not have this capability.

How LASER Used

The compact LASER system consisted of the optical transmitter and receiver mounted on a bracket fastened to the superstructure of the Kaho (see Fig. 1); the cathode ray tube readout unit was in the pilothouse (see Fig. 2).

Fig. 1 - Compact LASER, optical transmitter and receiver, secured to the superstructure of the R/V Kaho.

The LASER head was designed to provide a 10 millijoule, 20 nanosecond pulse at 5,300 angstroms. The optical configuration consisted of an 8-inch by $\frac{3}{8}$-inch neodymium doped glass rod pumped by a close-coupled linear Xenon flashlamp. The signal impulse and return were intermittently recorded on film for later study. For comparison purposes, a high resolution "white line" echo sounder was used to record bottom topography plus fish abundance and distribution.

Fig. 2 - Oscilloscope with camera attached used to record LASER transmitted and reflected impulses.

All LASER readings were taken while drifting, with the unit mounted 12 feet above the water. Water turbidity was recorded by a secchi disk.

Results

The results of this brief preliminary study were encouraging enough to warrant further investigation, in the laboratory and in the field. The deepest penetration, about 105 feet, was achieved about 15 miles offshore in 47 fathoms of water at 2100 hours. The secchi disk rading was 9 feet 4 inches in this location at 1930 hours. In shallower water where alewife were highly concentrated, penetration of about 9 feet was achieved in 7 fathoms. Because the LASER system is so sensitive to background light and it is difficult to penetrate the severe turbidity in the inshore waters, good fish identifications could not be obtained. Further tests are planned when waters are less turbid and the data obtained have been analysed thoroughly.

Surface water temperature ranged from 46.0° to 47.0° F. and air temperature from 45.0° to 52.0° F. during sounding operations. Water color varied from dark brown at 6 fathoms to blue-green at 47 fathoms.

"Kaho" Studies Potential of Purse and Lampara Seines

BCF fishing gear specialists aboard the R/V Kaho conducted experimental fishing operations with a purse seine and a lampara seine in southern Lake Michigan for 6 weeks between April 10 and May 26, 1967 (Cruises 39 and 40). The seines are being studied to learn their potential for the more economic harvest of the prolific alewife, which now dominates the fish population of Lake Michigan. The specialists also tested a mercury vapor light for concentrating fish during darkness.

The experiments were conducted off Gary, Indiana, and Saugatuck, Michigan. Some lampara seine trials were carried out aboard the "Chambers Bros.", a converted Lake Michigan trawler that cooperated in the experiments. Fish concentrations were monitored with a high resolution "white line" echo sounder.

Prolonged strong northerly winds the past spring severely limited the number of days suitable for open water seining and also caused alewife schools to move off shore into deeper waters. Although catches were generally small, the vessel and crew handled nets and equipment competently by end of cruises.

How Experiments Were Conducted

Fishing equipment tested included a modified menhaden purse seine 1,500 feet long by 90 feet deep (Figs. 1, 2 & 3) and a lampara seine 1,000 feet long by 35 feet deep (Figs. 4, 5 &6). A 400-watt mercury vapor light

Fig. 1 - 1,500 foot modified menhaden purse seine and allied gear aboard R/V Kaho.

Fig. 2 - Pursing 1,500 foot modified menhaden purse seine aboard R/V Kaho.

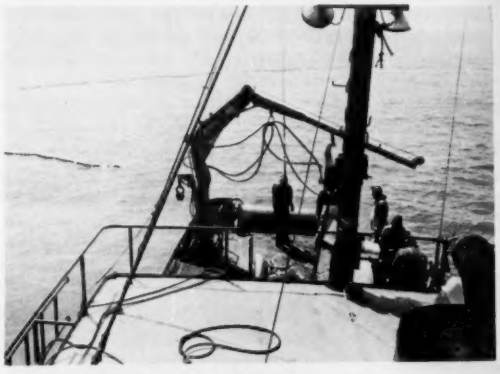


Fig. 3 - Retrieving 1,500 foot modified menhaden purse seine through power block aboard R/V Kaho.

Fig. 4 - Setting 1,000 foot lampara seine from commercial trawler Chambers Bros.

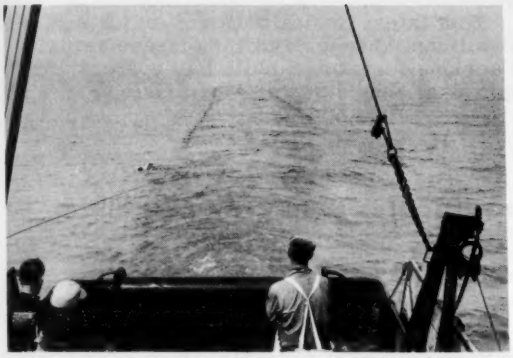


Fig. 5 - Fishing lampara seine using Suberkrub type doors to spread net from commercial trawler Chambers Bros.

Fig. 6 - Retrieving lampara seine aboard commercial trawler Chambers Bros.

light (32,000 foot candle power) was used with the lampara seine operations at night.

Experimental fishing tests of the purse seine were inconclusive because the tests were limited by weather conditions and dispersed fish schools.

Fishing experiments with the lampara seine included towing it with special spreading devices and setting it in the conventional circular pattern. Devices used for spreading the seine in the towing trials included V-shaped aluminum trawl doors, fitted with trawl floats for buoyancy and Suberkrub-type midwater doors, 4 by 8 feet, made from $\frac{3}{8}$-inch marine plywood.

Setting and towing the lampara seine "trawl fashion" resulted in the bunt end closing from its normal vertical opening of 35 feet to only 4 feet. The modified V-aluminum trawl doors with floats gave about 40 feet spread with 200 feet of warp. The Suberkrub-type midwater doors gave about 83 feet spread with 200 feet of warp.

Best catch results with the lampara seine were achieved at night; the gear was set in the conventional circular fashion. Before setting the seine, the 32,000 foot candle mercury vapor light was turned on for 30 minutes to attract alewife. The lamp was then turned off and the seine set around a drifting buoy mounted with a propane gas light. One haul of the seine using this method yielded 900 pounds of alewife. It was not possible to compare the effectiveness of lampara seining with and without the lights because the weather interfered. Echo sounder recordings revealed nothing about the reaction of fish to the light.

Echo Sounding Surveys

Large bottom schools of alewife were detected at 7 fathoms and shallower from Benton Harbor, Michigan, to Gary, Indiana, on April 16. On April 28, large concentrations were located in the same depth range off Gary and Saugatuck.

U. S. Fishery Products Will Be Shown At Cologne Fair

The U. S. will show its fishery products at the world's premier food fair--the one in Cologne, Germany, September 30-October 8, 1967. This biennial fair draws about 2,500 exhibitors and 250,000 trade and public visitors from 5 continents. The 1965 fair included exhibitors from 60 countries and 45 official national displays. It was the first overseas exhibition in which BCF took part. As a result of it, more than $300,000 of U. S. fishery products were sold.

During the first 2 years of BCF's Foreign Trade Expansion Program, U. S. fishery products have been displayed, sampled, and promoted at 11 food trade fairs in 6 western European countries.

Information about the fair may be obtained from the Office of International Trade Promotion, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington, D. C. 20240.

European Oysters Cultured for U. S. Research

In March, researchers at BCF's Milford, Conn., laboratory obtained a setting of European oysters in tanks from artificial spawning of adults in mid-January. The original oysters were imported from Holland 15 years ago and have been maintained at the laboratory through annual spawning of mature adults.

Researchers throughout the U. S. use oysters cultured at Milford to study growth and survival under different environments. This long-term program demonstrates the degree to which some species can be maintained under controlled conditions.

Lake Trout Return to Same Spawning Reef

Tagging experiments in Lake Superior show that adult lake trout disperse widely between spawning seasons--but return to the same spawning reef each year. The experiments were conducted by biologists of BCF's Ann Arbor, Mich., Biological Laboratory.

They also report that sea lamprey control produced substantial gains in the abundance index of legal trout in 1966. Natural production of lake trout now is augmenting hatchery releases.

MSX Still Found in Chesapeake Bay Oysters

Scientists of BCF's Oxford (Md.) laboratory found Minchinia nelsoni (MSX) in oysters they took from Eastern Bay (Md.) in March. This pathogen never has been reported so far north in Chesapeake Bay.

Oysters from nearby areas did not contain the blight. Holland Straits, Kedges Straits, Fishing Bay, Honga River, and Potomac River continue to have high prevalence.

This latest finding does not indicate a significant change. But the disease remains a serious threat to middle Bay oysters, despite last year's seeming remission.

Investigates Blue Crab Mortalities

Blue crab mortality in a stretch of the South Atlantic from Charleston, South Carolina, to Sapelo Island, Georgia, brought requests of BCF to investigate the cause. Researchers at BCF laboratories began analyzing samples for pesticide residues and other possible causes of mortality. Two biologists were sent to the area to assist the affected states.

This general area experienced heavy blue crab mortality last year. It was attributed to bacterial infection of the gills. This year's mortality appears to be caused by the same disease and to be more serious.

Prepares "Outdoor Fish Cookery" Materials

BCF's National Marketing Services Office prepared an 8-page brochure for use by the Agricultural Cooperative Extension Services. The publication is one of many materials developed by BCF for the Government-Industry "Outdoor Fish Cookery" campaign.

The brochure includes information on buying fishery products, tips for barbecuing, and 6 recipes on outdoor fish cookery.

Retail merchandising flyers and retail ad inserts also were developed to stimulate and help the managers of retail stores and seafood countermen in the campaign. Several national retail food chains will use these materials during the campaign.

FEDERAL ACTIONS

Commerce Department

PUBLISHES PROPOSED PROCEDURES UNDER FAIR PACKAGING AND LABELING ACT

The Department of Commerce published in the "Federal Register" of May 23 a "Notice of Proposed Rule Making" under the Fair Packaging and Labeling Act of 1966.

The Commerce Department does not have responsibility or authority under the Act to issue regulations governing the packaging or labeling practices of private industry. But it does have responsibility and authority to:

(1) Determine whether there is "undue proliferation" (excessive growth) of weights, measures, or quantities in which any consumer commodity is being distributed in packages for retail sale, which "impairs the reasonable ability of consumers to make value comparisons."

(2) Request manufacturers, packers, and distributors--where a determination of undue proliferation has been made--to help develop a voluntary product standard under procedures governing the Department's voluntary standards program.

(3) Recommend to Congress whether legislation providing regulatory authority should be enacted. The Department would do this if, after one year from date private industry was asked to develop a voluntary product standard, the Department determines that a standard will not be published, or be observed if published.

How Department Would Proceed

When the Department receives information about undue proliferation--and finds good cause for action exists--it will begin inquiry to find facts.

It will publish a notice of the inquiry--including a description of the consumer commodity--and give the public a chance to submit data or statements.

The Department of Commerce would publish a proposed determination whether there is undue proliferation. After that, interested persons could request an oral hearing. A final determination would be published.

Interior Department

NEW TUNA REGULATIONS ANNOUNCED

Amended regulations for taking yellowfin tuna from the eastern tropical Pacific Ocean were published in the "Federal Register" on June 23, 1967, by the Director, BCF.

The announcement explained that the experience gained since the adoption of the regulations (effective September 15, 1966) had shown a need for minor revisions to clarify their scope and intent and to make them more effective.

The new yellowfin tuna regulations involve changes in sections on: (1) Definitions (par. "n"--"closed season"); (2) Basis and purpose; (3) Open season; (4) Restrictions applicable to fishing vessels; (5) Restrictions applicable to cargo vessels; and (6) Reports and record keeping.

* * *

PROPOSES REGULATIONS FOR GRANTING U. S. FUNDS TO CONTROL JELLYFISH

On June 13, Secretary of the Interior Stewart L. Udall announced proposed regulations for granting Federal matching funds to the States to control jellyfish, floating seaweeds, and other pests. Congress is considering a $100,000 appropriation for fiscal year 1968.

Under the regulations, priority will be given to projects having "an immediate effect" on jellyfish, often called sea nettles, or floating seaweed. Payments will be made to states as work "progresses and is completed."

The Jellyfish Act of 1966 authorized U. S. financial assistance to States to protect fish and shellfish resources and recreational areas in U. S. and Puerto Rican coastal waters from jellyfish.

The program, administered by BCF, will fund specific research projects in the coastal States. It will encourage cooperative agreements between States to carry out the law's objectives.

A Notice of Proposed Rule Making setting procedures to be used by the Secretary of the Interior in providing financial assistance was published in the "Federal Register" June 13.

Labor Department

NEW WAGE RATES FOR TUNA CANNERIES IN AMERICAN SAMOA RECOMMENDED

A review of minimum wage rates under the Fair Labor Standards Act for all industries in American Samoa, including tuna canneries, was recently conducted by Special Industry Committee No. 7 for American Samoa appointed by the Secretary of Labor.

Following investigation and public hearings, the committee's report containing findings and recommendations was filed with the Administrator of the Wage and Hour and Public Contracts Division, Department of Labor.

Slight Increase for Cannery Workers

Tuna canneries were included in the hearings because the minimum wage for tuna canneries in American Samoa is less than the mainland's. The committee recommended that minimum wage for employes in fish canning and processing and can manufacturing be increased from present $1.00 an hour to $1.05 an hour, effective June 24, 1967, and to $1.10 on June 24, 1968.

The recommendations were published in the "Federal Register," June 8, 1967.

Corps of Engineers

A DENIAL OF DREDGE-AND-FILL PERMIT IS CONTESTED

In March 1967, the District Office of the U. S. Army Corps of Engineers in Jacksonville, Florida, denied a permit for dredging and filling in Boca Aega Bay, Pinellas County. Its reason was that the operation would be harmful to the area's fish and wildlife resources.

On May 11, the company that had requested the permit filed suit in Federal District Court in Tampa to order the Corps to issue the permit. The company questions the conservation grounds for denying the permit. More important, it questions the Corps' authority to deny a permit under the Fish and Wildlife Coordination Act.

The Corps intends to fight the case. It has asked the Fish and Wildlife Service to supply expert testimony. A court hearing will be held later this summer.

CANNING OF FISHERY PRODUCTS PREVENTS MICROBIOLOGICAL SPOILAGE

"The canning of fishery products in hermetically-sealed, heat-sterilized containers has for its objective the prevention of spoilage through microbiological action. Fresh, dried, salted, or smoked fishery products may be rendered unfit for use by a wide variety of causes, but to protect canned fishery products careful consideration must be given to microorganisms which are the cause of putrefaction or spoilage under ordinary circumstances.

"Microorganisms, as the name indicates, are a class of living things too small to be seen except by the aid of a high-powered microscope. They are unicellular; that is, each life cell is a separate and complete organism, though they may be joined in chains or masses. Microorganisms are intermediate between plant and animal life, some almost plants, other animals. They are divided into three general groups: yeast, molds, and bacteria."

--"Principles and Methods in Canning of Fishery Products," Research Report No. 7, p. 15, U. S. Fish and Wildlife Service.

INTERNATIONAL

U.S.-Japan Agree on Fishing in U.S. Contiguous Zone

U. S. and Japanese delegations adjourned discussions on May 9 after agreeing on the nature and extent of Japanese fishing off the U. S. coast. The agreement provides:

1. Japan will take necessary measures to ensure that her nationals and vessels fish only in the waters listed below, which are contiguous to the U. S. territorial sea and extend to 12 nautical miles from the baseline from which the U. S. territorial sea is measured.

(1) (i) Crab fishing off the Pribilof Islands.

(ii) Dragnet and long-line fishing:

(A) off the Bering Sea coast of the Aleutian Islands:

(a) between 166°45' and 173° W. longitude; between 174° and 174°40' W. longitude; and west of 176° W. longitude;
(b) from March 1 through August 31: between 173° and 174° W. longitude; and between 174°40' and 176° W. longitude;
(c) from December 1 through May 31: between 165° and 166°45' W. longitude.

(B) off the Pacific coast of the Aleutian Islands:

(a) between 169° and 173° W. longitude; and west of 178°30' W. longitude;
(b) from March 1 to August 31 inclusive: between 166° and 169° W. longitude; and between 173° and 178°30' W. longitude.

(C) off the Pribilof Islands.

(iii) Tuna fishing in all waters, except off U. S. mainland (including Alaska), Puerto Rico, Virgin Islands, Panama Canal Zone, and Hawaii, Maui, Molokai, Oahu, Kauai, Lanai, and Niihau of the Hawaiian Islands.

(iv) Whaling in all waters off Alaskan coast, except off Pacific coast between 150° and 163° W. longitude.

(2) Loading operations:

(i) On east side of Kayak Island in Alaska between 59°52' and 59°56' N. latitude west of 143°53' W. longitude, and on west side of Kayak Island between 59°56' and 60° N. latitude.

(ii) On west side of Sanak Island in Alaska in waters bounded on north by 54°36' N. latitude, on south by 54°26' N. latitude, on west by 163°05' W. longitude, and on east by 162°40' W. longitude.

2. Nothing in arrangements prejudices claims of either Government concerning jurisdiction of a coastal state over fisheries.

3. The arrangements will become effective May 9, 1967, and continue until December 31, 1968. In one instance, the end of effective date will be May 31, 1969--for dragnet and long-line fishing off Bering Sea Coast of Aleutian Islands, between 165° and 166°45' W. longitude.

The 2 Governments will meet before December 31, 1968, to review the operation of the arrangements and to decide on future ones.

Also, the representatives reached understanding concerning certain restrictions on Japanese fishing beyond the U. S. 12-mile zone, and on Japanese fishing for salmon within the 12-mile zone in the Western Aleutian area. (U. S. Embassy, Tokyo, May 19, 1967.)

Mexico and U.S. Discuss Jurisdiction Over Marine Fisheries

Representatives of Mexico and the U. S., meeting in Washington May 15-25, discussed the recent changes their nations made in laws relating to jurisdiction over marine fisheries within the contiguous zone off their territorial seas. They discussed the conditions under which U. S. fishermen may be permitted to continue their traditional fisheries in that zone.

The Mexican law establishes an exclusive fisheries zone between 9 and 12 miles off the coasts. It provides, under certain conditions, that foreign fishermen may continue their traditional fishing within that zone for 5 years beginning 1968.

High-Level Representatives

The Mexican delegation was headed by the Ambassador to the U. S., Dr. Hugo B. Margain; it included Ambassador Dr. Oscar Rabasa, Legal Adviser to the Secretariat of Foreign Relations, Capt. C. G. Gilberto Lopez Lira, Secretariat of the Navy, and Dr. Jorge Echaniz R., Director General of Fisheries, Secretariat of Industry and Commerce.

The U. S. delegation was headed by Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State; it included H. E. Crowther, Director, U. S. Bureau of Commercial Fisheries, Raymund T. Yingling, Legal Adviser for Special Functional Problems, Department of State, and William M. Terry, Assistant Director for International Affairs, BCF. Both delegations were assisted by advisers representing their Pacific and Gulf Coast industries.

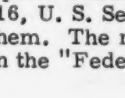
Prepare Joint Report

The areas of agreement, reservations, and suggestions are incorporated into a joint report to the Governments. The report contains points that can be a basis for continuing traditional fishing by nationals of each country within the exclusive fishery zone of the other country during a limited period. (Department of State, Washington, D. C. May 25, 1967.)

U.S.-Honduras Fishing Negotiations Begin

Delegations of Honduras and the U. S. began discussions to reach agreement on fishery problems in waters of the Atlantic Ocean. Negotiations centered on continuing traditional U. S. fishing in areas of exclusive Honduran fisheries jurisdiction within 12 miles of the latter's coast.

The discussions began in Tegucigalpa, Honduras. A U. S. proposal formulated as a basis for these discussions is being studied by Honduras. The discussions will continue at a time and place agreed upon by the Governments. (U. S. Department of State, May 8, 1967.)



U. S. Approves IATTC 1967 Yellowfin Tuna Limit

On May 11, the U. S. Secretary of the Interior approved recommendations by the Inter-American Tropical Tuna Commission (IATTC) pertinent to yellowfin tuna fishing in the Eastern Tropical Pacific Ocean during 1967. On June 16, U. S. Secretary of State also approved them. The notice of approval was published in the "Federal Register" on June 20.

The recommendations were part of a resolution adopted by IATTC at its annual meeting in San Jose, Costa Rica, April 4-6.

The Commission recommended action to:

1. Establish a catch limit (quota) on the total catch of yellowfin tuna for calendar 1967 of 84,500 short tons from the regulatory area defined by the Commission on May 17, 1962.

2. Reserve part of that quota to allow for incidental catches of tuna vessels when fishing for other species in regulatory area after unrestricted fishery for yellowfin tuna has been closed.

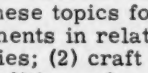
3. Close the fishery during 1967 when quantity already caught, plus expected catch by vessels at sea with authority to fish without restriction, reaches 84,500 short tons--less the portion reserved for incidental catches. Such closing date would be determined by Director of Investigations.

Vessels would be permitted to enter the area after closure of the yellowfin tuna fishery with permission to fish only for other species. But they would be allowed to land not more than 15 percent by weight of yellowfin tuna in the catch of all marketable species caught within regulatory area during closed season.

FAO and BCF Schedule Conference on Research Craft

The Second Technical Conference on Fishery Research Craft will be held in Seattle, Wash., December 11-15, 1967. The UN's Food and Agriculture Organization (FAO) and the U. S. Bureau of Commercial Fisheries are cosponsors. The theme will be modern fishery research craft with emphasis on unusual advanced and integrated vessels. Special attention will be given to problems in data collection and processing.

A "call for papers" was issued May 1. Contributors were asked to concentrate on problems and their solutions rather than on descriptions of vessels. The provisional agenda lists these topics for discussion: (1) craft requirements in relation to type of research activities; (2) craft requirements in relation to conditions of operation; (3) design and construction of fishery research vessels; (4) arrangements and fixed equipment on board; (5) operational problems; (6) cost per day/scientific output efficiency; (7) use of other craft for fishery research; and (8) trends.



World Fish Meal Production Declines Slightly

World fish meal production in January-March 1967 showed a small decline from the 1966 period. Peruvian output was below the high level of early 1966. Chilean production also was down. South African production gained substantially.

Most principal countries producing fish meal submit data to the International Association of Fish Meal Manufacturers monthly (see table).

Country	Mar.		Jan.-Mar.	
	1967	1966	1967	1966
	(Metric Tons)			
Canada	3,597	4,953	17,854	18,918
Denmark	1,911	6,565	13,917	19,856
France	1,100	1,100	3,300	3,300
German Fed. Repub.	5,558	7,088	17,721	20,000
Netherlands	1/	512	1/	1,051
Spain	1/	1/	1/	1/
Sweden	280	342	1,346	768
United Kingdom	5,333	10,681	20,568	26,437
United States	4,013	4,359	13,320	8,788
Angola	1/	3,805	1/	13,484
Iceland	12,513	11,376	22,513	24,206
Norway	52,962	57,590	96,522	90,175
Peru	163,512	194,309	560,642	616,019
So. Afr. (including S.-W. Afr.)	49,985	32,595	86,796	54,276
Belgium	375	375	1,125	1,125
Chile	8,294	13,521	45,120	74,062
Morocco	1/	1/	1/	1/
Total	309,433	349,171	900,744	972,465

1/Data not available.
Note: At present, Japan does not report production to the International Association of Fish Meal Manufacturers on a monthly basis. In 1965, Japanese production of fish meal was 356,000 metric tons, according to the Food and Agriculture Organization "Yearbook of Fishery Statistics, 1965" vol. 21.

Antarctic Whale Oil Output Declines in 1966/67 Season

Production of baleen whale oil in the 1966/67 Antarctic pelagic season, which began December 12, 1966, and ended April 7, 1967, is estimated at 71,155 short tons. This compares with 83,955 and 158,244 tons in 1965/66 and 1964/65, respectively.

Production data for sperm whale oil are not yet complete, but output by Japan and Norway declined 16 percent. Total production likely will be markedly below the 59,232 tons produced in 1964/65.

Production of Whale Oil in the Antarctic Pelagic Season1/

Participating Country	Baleen Oil		Sperm Oil2/	
	3/1966/67	1965/66	3/1966/67	1965/66
	(Short Tons)			
Japan	34,222	44,589	2,203	2,849
Soviet Union	4/22,035	21,317	5/	34,676
Norway	14,898	18,049	4,966	5,707
Total	71,155	83,955	5/	43,232

1/Converted from original unit at rate of 170 kilograms, or 374.78 pounds of oil, per barrel.
2/Including catch of sperm whales north of latitude 40° S. on voyage to and from Antarctic.
3/Preliminary.
4/Estimate based on catch of 1,069 blue whale units, with assumed outturn of 110 barrels of oil per blue whale unit.
5/Not available.
Source: "Norwegian Whale Gazette," Oslo.

Blue Whale Catch

The total Antarctic catch this season amounted to 3,503 blue whale units (BWU). Based on official figures, baleen whale oil output by Japan declined. Norway's output also declined as a result of reduced oil yield per BWU caught. Russian output is estimated to have increased; however, actual production has not yet been reported officially.

During the 1966/67 Antarctic pelagic season, 9 factoryships and 120 catcher boats were in operation--1 factoryship less and 8 catcher boats less than in the previous season. ("Foreign Agriculture," May 29, 1967, U. S. Department of Agriculture.)

Polish-FAO Cooperation in Fisheries

Paul Lamartine-Yates, Deputy Director General for Europe of the UN's Food and Agriculture Organization (FAO), talked with Polish officials April 27-May 3 about FAO-Polish cooperation in fishery matters. They discussed in particular technical assistance by FAO to organize Polish deep-sea fishing and to construct in Polish shipyards fishing vessels for developing countries. ("Trybuna, Ludu," May 3, 1967.)

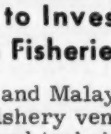
In 1966, Poland asked the United Nations Development Program (Special Fund) for US$1.2 million to assist in establishing a "research center for high-seas fisheries." The funds would be used to expand the facilities and programs of the Marine Fisheries Institute at Gdynia.

Japan and USSR Extend Kelp Agreement

A 2-year extension of the Japan-USSR kelp agreement was signed in Moscow on May 15, 1967, by the president of the Japan Fisheries Society and the Soviet Chief of the International Bureau, Fisheries Ministry. The agreement, concluded in 1963, permits Japanese fishermen to collect kelp in the Nemuro Strait off Shigunarinui Island (Kuril Islands, northeast of Hokkaido) during the season--June 10-September 30. The Japan Fisheries Society will pay kelp harvesting fees of 12,000 yen (US$33.34) per vessel to the Soviet fisheries agency. ("Nihon Suisan Shimbun," May 17, 1967.)

Mexico and Poland Talk Trade

Poland has proposed to sell several tuna vessels to Mexico and also the machinery for a plant to process the fish. In return, Poland would agree to purchase at world market prices all the processed fish. The vessels would be constructed in Poland and the processing machinery and equipment for the plant would be acquired by Poland from Czechoslovakia. Selection of the plant site and other details of the proposal were studied by members of a Polish team and Mexican technicians. (U. S. Embassy, Mexico.)



South Korea to Invest in Malaysian Fisheries

South Korea and Malaysia have agreed to promote joint fishery ventures, and the former has promised technical assistance. The first venture reportedly will begin this year.

The agreement followed a visit during April 16-21 by a 13-man Malaysian Fisheries Team led by the Minister of Agriculture and Cooperatives. For Korea, negotiations were directed by the Minister of Agriculture and Forestry. (Joint communiqué issued April 21, 1967.)

Romania Participates in ICNAF Meeting for First Time

Four representatives of the Romanian Socialist Republic attended the 17th Annual Meeting of ICNAF in Boston in early June 1967. They were led by eng. Constantin Nicolau, Secretary General of the Romanian Ministry of Food Industries, which has jurisdiction over both fresh-water and marine fishing industries.

Romania began fishing in subarea 5 (Georges Bank) of ICNAF in 1965 with 2 large stern factory trawlers purchased in Japan in 1964. The same two trawlers (the "Galati" and the "Costanta") alternated in fishing on Georges Bank from June to October 1966. The catch was mostly herring.

Japanese Vessel Seized by New Zealand

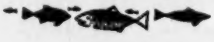
A Japanese fishing vessel was seized on April 27 by a New Zealand patrol boat on a charge of violating territorial waters. On April 29, the vessel was fined 22 pounds 10 shillings (US$63) and her catches confiscated. The vessel reportedly was fishing beyond the 3-mile sea limit--about 8 miles from the coast. ("Shin Suisan Shimbun Sokuho," May 2, 1967.)

Japan and New Zealand Agree on 12-Mile Fishery Zone

The Japan-New Zealand talks concerning the latter's 12-mile exclusive fishery zone, which opened in Wellington May 22, reached a settlement on June 3.

The agreement reportedly provides for continued Japanese long-line sea bream fishing within the 12-mile zone at the present scale (15-16 vessels a year) for 4 years; she will cease voluntarily in the fifth year.

In the early stage of negotiations, Japan also had sought recognition of her trawl fishing inside New Zealand's claimed waters but later withdrew this claim because of the relative insignificance of the catches there. ("Suisan Tsushin," June 7, 1967.)



Soviets Protest Argentine 200-Mile Maritime Limits

"Rybnoe Khoziaistvo," official organ of the Soviet Ministry of Fisheries, carried a 2-page lead editorial in its March issue attacking the Argentine Government for extending its maritime jurisdiction to 200 miles. One paragraph linked the Argentine action to that of other South American countries: "After World War II certain capitalist countries began making unilateral attempts to extend their jurisdiction over areas of the high seas. These claims were not recognized by the overwhelming majority of other states and in many cases brought sharp protests. Unfortunately, this practice has not ceased even at present."

The editorial said that Argentina (1) signed all four 1958 Geneva Conventions and is now reneging; (2) adopted the new Law and its Decree hastily, and that the two contradict each other.

Soviet Captain Fined in British Court

On April 29, 1967, the British Fisheries Enforcement vessel "Belton" detained the Soviet medium fishing trawler "SRT-3137" and its crew for fishing illegally within the British 12-mile fisheries zone. The Soviet vessel was observed fishing 9.8 miles off Sumburgh Head (Shetland Islands).

In Lerwick court, the Soviet captain said that he had thought he was fishing 17 miles from the shore. He blamed the mistake on his broken radar set, which had forced him to take radio-direction bearings. He was able to support his contention with excerpts from the vessel's log. He added that he had not really been fishing but only exploring for the Latvian Fishing Fleet, to which his vessel belongs. In view of these mitigating circumstances, and because this was the first time in 16 years of Soviet fishing off the Shetland Islands that a Soviet vessel had violated British fishery laws, the captain was fined only 50 British pounds. Neither gear nor catch was confiscated. ("Fishing News," May 12, 1967.)

Asian Tuna Conference Is Reported Productive

The 2-day Asian tuna conference held in Tokyo May 30-31 attracted over 40 representatives from South Korea, Formosa, Okinawa, and Japan. They discussed production, price, marketing, consumption, management, labor, regulations, and administrative policies. National positions on various issues were clarified. The atmosphere was friendly and cooperative. The conference was initiated by NIKKATSUREN, the Japan Federation of Tuna Fishermen's Cooperative Associations.

The participants agreed to meet annually and picked Formosa for next year's meeting.

Discussion of the tuna price problem drew considerable attention. NIKKATSUREN proposed that this problem be considered from the standpoint of cooperating on all tuna exports, but South Korea and Formosa insisted on limiting discussions to tuna prices at American Samoa, Espiritu Santo, and the Fiji Islands. It was agreed to appoint an 8-man study group (2 members from each country) to look into prices in the Pacific, Atlantic, and Indian Ocean areas. The group was scheduled to hold its first meeting on June 3, 1967. The South Koreans, Formosans, and Okinawans voiced strong dissatisfaction over the present price setting method at American Samoa, where only Japanese trading firms negotiate prices with U. S. packers. They urged that the producers' wishes be reflected more strongly in those negotiations.

Conservation Discussed

Conservation of tuna resources was emphasized by NIKKATSUREN. South Korea and Formosa, while recongizing need to protect the resources, took a negative attitude toward adopting conservation measures immediately. However, all participants agreed to cooperate in resource investigations and to exchange data.

Discussions of production and marketing revealed that South Korea, Formosa, and Okinawa, whose tuna production is increasing annually, do not have their own sales organization or overseas outlets. They export through Japanese trading firms or other agents. They expressed interest in forming an organization that would give them greater independence in sales.

Tuna production and exports in 1966 by South Korea, Formosa, and Okinawa, as well as the size of their tuna fleets, are shown below. ("Suisan Keizai Shimbun," June 1 & 2, 1967, and other sources.)

Country	Size of Tuna Fleet		Production	Exports
	No. Vessels	Gross Tonnage	(Metric Tons)	
South Korea	132	11,532	16,000	16,000
Formosa	701	38,000	43,330	21,848
Okinawa	45	9,206	10,340	7,019

Yellowfin Tuna Fishery Closed June 24

The 1967 yellowfin tuna fishery in the eastern Pacific was closed at noon June 24, reported Gerald V. Howard, BCF Regional Director, Terminal Island, Calif. The action was taken to implement recommendations of the Inter-American Tropical Tuna Commission, at its annual meeting in April, for a catch quota from the eastern Pacific of 84,500 tons for 1967. On June 20, the Commission's Director, Dr. J. L. Kask, recommended to the nations affected that the closure become effective on June 24. Member governments are the U. S., Mexico, Costa Rica, Panama, and Ecuador. Japan and Canada are cooperating in the program.

On June 19, the yellowfin tuna catch was about 68,671 tons. A closure must become effective before the quota is reached to allow for catches yet to be made by vessels at sea when it occurs, and for incidental catches of yellowfin. Fishermen leaving after closure will be permitted an incidental catch of yellowfin tuna not to exceed 15 percent by weight of all marketable fishes taken on a fishing trip.

The yellowfin fishery also operated under a quota in 1966 as part of the Commission's conservation program to rebuild the yellowfin tuna population to maximum production. Enforcement of the U. S. regulations is undertaken jointly by BCF and California's Department of Fish and Game.

Asian Fishery-Oceanography Experts Meet

Thailand, South Viet Nam, and Indonesia are planning to launch a cooperative study of the food resources of the southern part of the South China Sea, reports John C. Marr, BCF Area Director, Hawaii.

The shallow portion of the sea is believed to hold immense resources of valuable bottom fishes. It is not intensely fished at present.

Marr returned last month from a meeting in Bangkok, Thailand, of the International Coordination Group of the Cooperative Study of the Kuroshio and Adjacent Regions (CSK). Marr is the U. S. National Coordinator for CSK and was elected CSK Assistant International Coordinator for Fisheries in 1965.

CSK, which began operations in 1964, is conducted under the auspices of UNESCO's Office of Oceanography with assistance for the fisheries phase of the project from the UN's Food and Agriculture Organization (FAO). CSK is a study of the western Pacific Ocean that has employed ships and scientists from several nations in special research activities.

The decision of Thailand, South Viet Nam, and Indonesia to conduct the survey was influenced by recommendations of the Indo-Pacific Fisheries Council in Honolulu in October 1966.

Meeting Well Attended

Represented at the Bangkok meeting were China, Japan, Korea, Phillippines, USSR, United Kingdom (Hong Kong), United States, Viet Nam, Singapore, and Thailand. This was the first meeting since the last two nations joined CSK. Indonesia sent observers and indicated its intention to join CSK in the near future. Dr. Kiyoo Wadati, Japanese meteorologist and International Coordinator for CSK, presided.

Marr extended an invitation from the U. S. to hold the next CSK meeting in Honolulu at the East-West Center of the University of Hawaii. He said: "Several of the delegates had attended the Honolulu meeting of the

Indo-Pacific Fisheries Council last October and were delighted with the way the meeting was handled by Dr. George Kanahele (Program Director, Conferences and Seminars, East-West Center) and his staff. They looked forward to visiting Honolulu again." The group voted to accept the U. S. invitation, subject to approval of the UN's Intergovernmental Oceanographic Commission, which meets in Paris in October.

The Honolulu meeting of CSK probably will take place in April 1968, the first at which scientific results of CSK studies will be presented. A 4-day symposium will be devoted to these studies, along with the regular business session.

International Symposium on Eutrophication

The first International Symposium on Eutrophication was held in Madison, Wisconsin, June 11-16. It was organized by the U. S. National Academy of Sciences-National Research Council. Nearly 1600 scientists registered for this meeting.

Eutrophication is a condition of waters during which they are rich in dissolved nutrients, are frequently shallow, and have seasonal oxygen deficiency.

Papers were given on the distribution of eutrophication throughout the world, indices of eutrophication, and methods of arresting it. Several instances were reported where eutrophication was arrested by diverting the high nutrient water flowing into lakes; diluting enriched lakes with water of low nutrient content; proper treatment of inflow waters; and by reducing the level of living organic material in lakes.

At the close of the Symposium, the Planning Committee recommended an information program to alert the public to cultural eutrophication and the urgency of solving the problem. It also recommended that large-scale demonstration projects be set up to show the effectiveness of various schemes in solving the problem.

FAO and USSR Arrange Study Tours

FAO and the Soviet Union cooperated in organizing 2 Group Fellowship Study Tours during May, June, and July. A third will be held later this year. The tours are part of the FAO Program of Technical Assistance (UNDP).

Seventeen representatives of 10 nations participated in the Study Tour/Seminar on Freezing and Canning of Fish May 12-June 9. This was the first study tour on fish utilization. It was designed to familiarize fishery technologists and fishery officers of developing nations with planning and operating fish processing establishments. The 17 participants were graduate technologists and researchers from government, industry, and universities. The nations represented were Brazil, Chile, Ghana, Mexico, United Arab Republic, Thailand, India, Costa Rica, Argentina, and Peru.

From June 5-July 8, a Sea-going Tour on Fisheries Biology and Oceanography was held. A series of lectures by Soviet scientists was followed by a cruise aboard the research vessel "Akademi Knipovich," in the Mediterranean. The sea tour was planned to inform fisheries scientists of fisheries methods, equipment, and gear types.

FOREIGN

Canada

PRODUCTION OF INDUSTRIAL FISHERY PRODUCTS INCREASES APPRECIABLY

Atlantic herring reduction facilities to produce oil and meal are expected to reach 7,000 tons a day this year and 10,000 tons a day by 1970, reports H. E. Power of the Fisheries Research Board of Canada, Halifax. Between 1963 and 1965, he said, herring oil production rose from 1,400,000 pounds to 7,140,000 pounds, and meal from 4,667 to 12,783 tons. Since 1964, 15 fish meal plants capable of producing herring meal have been built, or are being planned, on the Atlantic coast. M. S. Strong, Department of Trade and Commerce, Ottawa, notes that world fish meal production of 4,186,500 tons was 200 percent over 1958's figure. World production of fish oils also advanced considerably: in 1966, it was 732,100 metric tons, up 156 percent over 1958.

For nearly 10 years, Peru has been world's largest producer of fish meal--and, since 1962, she has produced about 36 percent of world's production. In 1966, Canada was 8th; Norway, Japan, Chile, and the U. S. followed Peru.

In the production of fish body oil in 1966, Canada ranked 7th. The main producers were Norway, Peru, Iceland, the U. S., and South Africa combined with Southwest Africa.

Export Trade Increases

M. S. Strong adds that the fish meal export trade has gained significantly. In 1966, world exports of 2,316,500 metric tons were an increase of 288 percent over 1958. Peru was first by far, followed by Norway, Chile, South Africa, and Southwest Africa (combined), and Iceland. Canada was 7th.

In 1966, exports of fish body oils rose 442,000 metric tons from 1958's 139,000. The ranking of exporting countries: Peru, Iceland, Denmark, Norway, South Africa and Southwest Africa combined, and the U. S. Canada shipped only 8,000 tons.

Largest importers of fish meal are West Germany and Britain. With the Netherlands, they account for over 50 percent of world consumption. Japanese imports, quintupled since 1961, are exceeded by only the 4 major importing countries.

Main consumers of fish body oils are Britain, Netherlands, Germany, Sweden, and France. But even in Europe, usage varies considerably.

M. S. Strong foresees increasing imports of fish meal by other West European countries. The expansion of the compounding industry in eastern Europe also should lead to increased demand there, he predicts.

Fish meal futures now are traded on the New York Produce Exchange and in London. ("Canadian Fisherman," June 1967.)

* * *

AMENDS FISHING VESSEL ASSISTANCE REGULATIONS

The Canadian Federal Department of Fisheries has announced that all applications for financial assistance to build fishing vessels must be received before a start is made on constructing these vessels. This change in the Canadian Fishing Vessel Assistance Regulations became effective April 26, 1967; full enforcement began June 15, 1967.

Under Fishing Vessel Regulations, the Canadian Minister of Fisheries is empowered to enter into agreement with Provincial fishermen's loan agencies--fishermen's loan boards or, in Quebec Province, the Minister of Industry and Commerce--to contribute toward building vessels.

What Agreement Specifies

Such an agreement stipulates that Federal Government would provide:

(1) Twenty-five percent of approved cost of fishing vessel having a minimum length of 35 feet and maximum of less than 45;

(2) Thirty percent of approved cost of constructing fishing vessel with a minimum length of 45 feet and maximum size of less than 100 gross tons; or

Canada (Contd.):

(3) Forty percent of approved cost of any wooden fishing vessel having minimum size of 100 gross tons.

To be eligible for assistance, fishing vessels under 15 gross tons must be inspected and earn Minister's approval. Before financial aid is considered for vessels of 15 gross tons or larger, a certificate from the Board of Steamship Inspection is necessary. (Canadian Department of Fisheries, June 15, 1967.)

* * *

TESTS IRRADIATION PRESERVATION OF WHITEFISH

Experiments with low-level gamma radiation have demonstrated that the storage life of fresh whitefish can be extended considerably by irradiation. The experiments were conducted at the Winnipeg fish inspection laboratory of the Canadian Federal Department of Fisheries, in cooperation with Atomic Energy of Canada Limited and the University of Manitoba.

Dressed whitefish in a sealed plastic bag were exposed to a low level of gamma irradiation for a short period. As a result, 99.9 percent of the bacteria, which contribute greatly to spoilage of fish, was destroyed. Thus treated, the package could be kept on ice, in fresh condition, for up to 29 days.

Cobalt-60 Unit Used

Equipment used to irradiate samples was a mobile Cobalt-60 gamma irradiation unit designed and constructed by Atomic Energy of Canada Limited.

Discussing the experiments, a Canadian scientist said: "While the process used in our research is too costly for the average fish packer and processor, no doubt engineering in the field of radiation will substantially reduce this cost in years to come." (Canadian Department of Fisheries, May 25, 1967.)

* * *

FIRST QUARTER LANDINGS RUN AT 1966 PACE

Canadian sea fisheries landings (including Newfoundland) during January-March 1967 were 315.6 million pounds with an ex-vessel value of C$10.9 million; in the same period of 1966, landings were 314.9 million pounds worth $12.6 million. (Excludes seaweeds.)

("Monthly Review of Canadian Fisheries Statistics," March 1967.)

Landings and exvessel value of principal species were:

Species	Jan.-Mar. Landings (1,000 Lbs.) 1967	1966	Jan.-Mar. Value (1,000 C$) 1967	1966
Atlantic Coast:				
Cod	41,244	71,966	1,914	3,319
Haddock	25,650	31,057	1,882	2,205
Pollock	9,027	5,768	355	224
Flounder and sole	31,003	18,447	1,079	659
Herring	99,844	31,606	1,117	380
Swordfish	30	60	26	47
Lobsters	622	858	523	839
Scallops	1,539	2,298	823	917
Pacific Coast:				
Halibut	-	-	-	-
Herring	78,059	118,195	1,288	1,950
Salmon	41	64	20	29

* * *

FISHERIES TRADE MISSION VISITS EAST EUROPE

Some prospects for fishery exports to Czechoslovakia were reported by a Canadian Fisheries Reconnaissance Mission that visited eastern Europe February 20-March 2, 1967. Canned sardines and frozen turbot were said to be the most encouraging possibilities in the near future; various species of frozen groundfish presented a longer term prospect.

Sales prospects in other Communist countries visited--Romania, Hungary, and Yugoslavia--were reported marginal at present. (U. S. Embassy, Ottawa, June 1, 1967.)

* * *

KENNEDY ROUND RESULTS EASE ACCESS TO U. S. MARKET

Government officials said the results of the Kennedy Round will increase opportunities for Canadian exporters of everything from fish sticks to television sets. They attribute this gain to tariff cuts by the U. S. and other nations.

Canada's most important general gain is easier access to the U. S. market. The Canadian-U. S. changes are expected to boost the present $13 billion in trade between them. Already, each is the other's largest trading partner.

Some areas of mutual tariff eliminations by the U. S. and Canada are extended to all nations under the most favored nations agreement. These include fresh and frozen fish, some agricultural products and minerals.

LATIN AMERICA

Cuba

FISHERIES EXPANSION IS PUSHED VIGOROUSLY

Cuba has doubled her fish catch--to over 50,000 tons a year--in the 7 years since Castro won power. At first the increase was produced by reviving the boatbuilding industry and by organizing cooperatives to fish the inshore waters. But with Soviet aid, Cuba has reached out to deeper waters and much larger vessels. She plans to catch 200,000 tons a year by 1970.

In Cuban plans, fish are an important source of protein in the diet because meat, while in sufficient quantity, is a major export commodity. The export of meat has to be increased to pay for imported machinery and capital equipment needed to modernize and strengthen the economy. The Government is moving rapidly to develop a major fishing industry.

The trawlers used in distant-water fishing--there are "dozens" of them--were built to order in foreign shipyards, mainly Spanish. The crews, totaling about 2,000 men, were trained by Soviet fishermen who sometimes accompany them. The trawlers operate on Atlantic and even Pacific fishing grounds.

The crews of trawlers--and of inshore fishing boats--receive 6 or 12 months' training at a school for seamanship and navigation in Havana; there too is a College of Navigation for skippers and mates of the deepwater fishing fleet.

Research Aided by Soviets and Japanese

Research is shared by 2 Havana-based institutes: Institute Nacional de la Pesca, Empresa Conserva de Pescados y Mariscos; and Instituto de Oceanologia. The former has 9 research vessels, plus one Soviet vessel, all about 100 tons. Soviet scientists have been working there since 1962. In 1963, they were joined by Japanese scientists. The institute gives top priority to the sardine--for eating and for producing fish meal. There also is a pilot scheme to use fish meal for human consumption.

The Oceanographic Institute has 12 Cuban research workers and some student helpers. It has no vessels of its own, but 2 Soviet vessels have been made available. Its program includes research into the home production of agar-agar. Cuba's annual need is 50-100 tons; she pays $8,000 a ton in foreign exchange.

Boatyards Spring Up

Since the revolution, boatyards have been built in such places as Manzanillo, Gibaro, and Puerto Padre. These yards first built small boats for inshore fishing on the "shelf" of the Cuban Archipelago. The Manzanillo yard, which started operations in 1962, built 75-foot-long fishing cutters of 20-foot beam, 25-ton hold capacity, and engine of 250-hp. motor. Eleven of these boats had been built by the end of 1964. A water shortage stopped production in the first half of 1965. The yard now is building Golfo 66 fishing cutters: 17-foot beam, 150-hp. motors of Soviet origin, crew of 13.

Havana's Chullima boatyard, ready in 1962, started building Lambda 75 fishing cutters. It can build 12 boats at a time. The successor to the Lambda 75 is the Sondero 67, smaller but using the same stem piece.

Also following the revolution, a state Fishing Company (Empresa Estatal de Pesca) was organized to operate a new fleet. The fleet was designed to run on Soviet lines with Soviet technical and other help. Today, the state-owned fleet has 3 main individual operating units: Flota Cubana de Pesca (Cuban Fishing Fleet) operating from Havana's new fishing port, which has all the long-distance vessels; the Flota del Golfo (Gulf Fleet), and the Flota de Cayo Largeo (Cayo Large Fleet).

Vessels operating in these fleets and those used by the many cooperatives use both Cuban- and foreign-built vessels.

Between 1961 and May 1966, Cuban boatyards employing 2,400 men produced 680 new vessels for the fishing fleets. The number is expected to reach 900 by 1970. The Government sees the fishing industry as an earner of foreign revenue and wants it to achieve more. Fishing operations were extended into both the north and south Atlantic. Advised by Soviet experts, Cubans went overseas to buy new distant water vessels.

Cuba (Contd.):

At the beginning of 1967, the Flota Cubana de Pesca had 45 vessels operating from the northwest to the southwest Atlantic and across to the eastern Atlantic off Africa. By 1970, Cuba expects to have a 700-ship fleet on the high seas--presumably the Lambda class and larger. This fleet, plus the 900 smaller vessels, is expected to boost fisheries production to 200,000 tons a year. Over 4,000 Cubans are being trained for the new fleet. The new fishing port at Havana is equipped to cope with the expected rise in landings.

USSR and Cuba Built Fishing Port

On September 25, 1962, Premier Fidel Castro and USSR Minister of Fisheries Aleksander Ishkhov signed an agreement to further develop the Cuban fishing industry. The agreement included the building of a modern fishing port complex at Havana to serve the expanding Cuban fleet and Soviet fleet in the western Atlantic. The USSR provided experts and grants. The port was officially opened exactly 4 years later--September 25, 1966.

Four quays have a total length of 1,000 meters. Three of the 4 are for loading, unloading, and provisioning vessels and are served by seven 5-ton cranes; the fourth, equipped with a 10-ton crane, is used for repairs and general heavy overhauls of vessels or their machinery.

Also, there is a floating drydock with a lifting capacity of 2,800 tons of deadweight. It can accommodate 1 BMRT factory trawler, 2 SRTR medium size trawlers or 1 SRTR, and 2 Lambda-class vessels.

The port is self-contained: 5 electrical generating substations, continuous design operation, and closed-circuit TV control system. There are 7 cold stores with capacity of 10,000 metric tons, and a quick-freezing plant (4 units) with a 30-ton-a-day output. An ice manufacturing plant has a daily output of 60-80 tons. There is a pilot fish-processing plant to prepare fish fillets; it will increase in size as production increases. Other plants contain ships stores, spares for vessels and machinery, fishing gear store, fishing gear assembly shop, and fish meal storage.

A new 24-hour, 85-person radio station has been built to handle operations of Cuban and Soviet vessels. It can control the workings of ships 500 to 2,000 miles away. Transmitters and receivers, housed separately, are operated by a central control position. (Abstracted from "Fishing News International," June 1967.)

Peru

SEEKS JAPANESE HELP TO DEVELOP FISHERY RESOURCES

Eager to stabilize her depressed fishing industry, and to promote domestic consumption of fish as a source of animal protein, Peru is seeking Japanese cooperation to explore and develop her coastal fishery resources. It is believed Peruvian coastal waters contain an abundance of mackerel, shrimp, and other unutilized species that could be harvested and processed. Peru's interest in developing those resources was heightened by the findings of 2 Japanese fishery teams that recently surveyed fishery conditions in Peru and other Latin American countries.

On May 12, the Vice-President of the Peruvian Fishery Association visited Japan on his way home from the FAO Fisheries Committee meeting in Rome. Reportedly, he conferred with the Fisheries Agency Director and Japanese industry leaders concerning the cooperative development of Peru's fishery resources. ("Suisan Tsushin," May 22, 1967.)

EUROPE

USSR

HOW SOVIETS HANDLE AND FREEZE TUNA ABOARD VESSELS

The best methods for the primary processing of tuna aboard fishing vessels--and the specifications for chilling and freezing--were tested aboard the Soviet tuna-fishing factoryship "Iarkii Luch."

The principal species fished were bigeyed and yellowfin. Both averaged 150-170 cm. (about 59-67 inches) long and weighed 70-90 kg. (154-198 pounds); their fat content ranged from 0.4 to 13 percent.

When kept in the open at 20°-25° C. (68°-77° F.), biochemical changes set in so quickly that the first signs of spoilage became evident after no more than 5 hours: the eyes whitened; a slight smell of decay was noticed in the gills; and the meat became flabby.

To extend the storage period, the tuna were chilled with flake ice on board the fishing vessels. Before chilling, the fish were bled (the blood loss averaged 2 percent) and washed with sea water (weight loss was around 1 percent). With a fish-to-ice weight ratio of 1:1, the fish remained fresh for as long as 1½-2 days. On the third day, the muscular tissue softened although the meat's appearance was good. During this period, the temperature in the insulated hold of the vessel was kept at 4°-6° C. (39°-43° F.) whereas that of the freshly caught tuna was 23°-25° C. (73°-77° F.). When the fish-to-ice ratio was 1:0.5, the flabbiness appeared after only two days. The weight loss of tuna during 12-16 hours of storage in the hold was 0.42 percent.

Transferred to Factoryship

The fish were transferred to the factoryship, where they were washed thoroughly with sea water. The weight loss was around 1 percent after draining. Then, they were stowed in a refrigerated holding area until canned or frozen. The temperature there was maintained at about -1° to -3° C. (30°-37° F.). With an initial temperature of 10°-20° C. (50°-68° F.) the fish were stowed in bulk and covered with ice in the ratio 1:1. The temperature of the fish dropped at a rate of 1 C. per hour during a storage time of 10-11 hours. After 20 hours of storage, the fish temperature was -1° C. (30° F.) at a meat depth of 5 cm. (2 inches), and plus 0.5° C. (32.9° F.) at 10 cm. (3.9 inches).

Experimental batches of tuna were kept in the holding area and covered with ice in the ratio of 1:1 for 10, 20, 30, and 40 hours. The microbiological and enzymatic processes were slowed down at storage temperatures of -2° to -3° C. (26.6° to 28.4° F.). Partial ice formation in the fish tissues is possible at such temperatures and can lead to a rupture of the meat tissues. However, no deterioration in quality was noticed.

The active acidity (pH) and water retention of muscular tissue also were determined during the storage period.

In fish muscles, rigor mortis set in after 4 or 5 days of storage in ice at hold temperatures of -1° to -3° C.; water separation from the tissues increased to 27 percent. Once rigor mortis was complete, the water retention of tuna meat rose, and considerably less juice was separated; on the 14th day, the quantity separated was 12 percent. Considerable softening of the muscular tissue was observed during this period.

Two Weeks May Be Maximum

The parallel determinations of pH illustrate the effect of storage time on meat quality. While pH after death was 7.2, it dropped with onset of rigor mortis to 5.9, and rose after 40 days of storage to 7.5--when fish were seen to deteriorate significantly and a distinctive stale odor emanated from gills. Hence, the longest storage period under these temperature conditions should not exceed 2 weeks. Canned tuna "in natural juice" made from such meat was very well received by Soviet consumers.

Most tuna was canned, but when the catches were large some were frozen, either whole or gutted. The total freezer capacity was 10 metric tons of fish per 24 hours. The freezing cycle lasted 22 hours. The natural weight loss of round gutted tunas during freezing was 0.72 percent, of whole tunas 0.84 percent.

USSR (Contd.):

After freezing, the fish were passed through a glazing machine consisting of a tank with a chain conveyor fitted with claws. The tuna were glazed with fresh water of 10°-15° C. (50°-59° F.). The glazing time was 5 seconds, and the glaze thickness only 0.94 percent of the fish weight (compared with 4 percent prescribed by Soviet standards). Then, the fish were packed in matting bales and slid down a spiral chute into the storage hold. This method caused part of the glaze to chip off, and tuna also were mechanically damaged.

Spray Fish With Sea Water

The frozen fish were kept in the hold at -25° C. (-13° F.). After one month, the natural weight loss was 1.43 percent; after two months, 3.27 percent of original weight. These losses are explained by changes in hold temperatures caused by frequent opening of hold during loading and unloading.

Both fresh and frozen tuna were used for canning. Before dressing, the frozen fish were thawed to -1° C. (30.2° F.). The quickest thawing--completed within 8-9 hours--was effected in a tank of sea water at 24° C. (75° F.) with a water-to-fish ratio of 2:1. However, due to the vessel's roll, the fish rubbed against each other, causing mechanical damage; the meat swelled and acquired a bad commercial appearance. This method was abandoned.

Thawing in the open air at 23°-24° C. (73.4°-75.2° F.) took 20-21 hours and resulted in considerable contamination of the fish and occupied a great deal of deck space.

The method of thawing finally accepted was to spray the fish with sea water. This technique combines the positive aspects of both methods: the speed of the first one, and the absence of mechanical damage of the second. The thawing time was 14-15 hours. (From article by Ionov and Semenov in Soviet periodical "Rybnoe Khoziaistvo," Dec. 1966.)

* * *

SHARK FINS ARE USED

Large Soviet tuna canning vessels (purchased in 1964-65 from Japan) catch some sharks and other species in addition to tuna. Various products are being made from shark meat; a shark cannery reportedly was set up at Murmansk and, recently, the Soviets began to use shark fins. The processing technique is described in the magazine "Rybnoe Khoziaistvo" (Nov. 1966).

Shark fins--pectoral, dorsal, and anal--are exceptionally tasty and nutritious and in great demand in international markets. Essentially, their processing aboard fishing vessels is as follows:

The fins, cut from the body, are thoroughly scrubbed with hard brushes in sea water, or in 3-5 percent salt solution, and then scrubbed and rinsed with fresh water. Some authors recommend soaking scrubbed fins in saturated brine for one hour to allow the salt to penetrate into the meaty base of the fins. After pickling, the fins are soaked in fresh water for 10 minutes and thoroughly rinsed with fresh water.

The washed fins are placed on a screen, drained, and hung by a string threaded through the meaty part. The fins should be spaced so not to touch each other when hung vertically.

Sun and Room Drying

It is recommended that the fins be dried in bright sunny weather, under a tent, during the first 3 days, and then in the open, or in drying rooms at a temperature of 40°-50° C. (104°-122° F.) with intensive air circulation. The quality of sun-dried fins is better than room-dried fins.

If the fins bend during drying, they should be straightened. Since bent fins cannot be packed tightly, they require more room and deteriorate more rapidly due to air in their interspaces.

For room drying, the fins are spread on wire frames. The drying time depends on fin size and drying conditions. Under favorable conditions, the drying time of medium-size fins in the open is 15-20 days; in a drying room, 5 to 8 days.

Correctly dried fins have a relatively straight, completely dry, dull surface, without folds and bends. The meaty base should be dry throughout and the thin parts resilient and elastic, but not brittle.

The dried fins are packed in clean boxes made of wood, plywood, or cardboard, and

USSR (Contd.):

lined with greaseproof paper, which also should cover the fins below the lid. Each box is filled to 3-5 cm (1.2-2.0 inches) above the rim. Then the lid is closed and weighted, and the box sealed and marked.

The sealed boxes are stored in dry, well-ventilated cool stores (holds) at a temperature not above 15° C. (59° F.), and with air humidity not over 75 percent. When stored in a humid atmosphere, fins are attacked by molds.

* * *

SOVIETS GROW SEAWEEDS

The Soviet Far Eastern Fisheries Administration plans to increase production of agar-agar. It is constructing a large agar-manufacturing plant.

To increase resources of "Ahnpheltia" seaweeds, the raw material from which agar-agar is produced, scientists of the Pacific Scientific Research Institute of Fisheries and Oceanography planted the bottom of Peter the Great Bay near Vladivostok with "Ahnpheltia" (red algae). The underwater fields are developing well. Additional and larger areas of the bay will be planted this year.

* * *

SOVIETS ARE PREPARING NEW FISHING FLEET MANUAL

A Leningrad conference last year examined the third draft for the new Service Manual of Soviet commercial fishing vessels. The drafts were prepared by the Soviet Federal Fishing Fleet Design Institute and reviewed by a special Editorial Commission of the Ministry of Fisheries, comprising almost 50 senior fishing captains and chief engineers. The Commission was headed by I. M. Semenev, Director of the Soviet Fishing Fleet Inspection Service. It was decided at the conference that the revised manual will contain 15 sections on the duties and rights of various persons aboard fishing vessels, and a supplement listing signals and commands used during a vessel's maneuvers.

The Captain's Role

The book will emphasize the captain's position as the sole responsible commanding officer. But, in his daily duties, he must rely on the Communist Party organization aboard the vessel. The vessel's Council will have 6 persons (captain, first and second mate, chief engineer, secretary of vessel's CP group, and secretary of vessel's Trade Union Committee). The Council will discuss all major problems, but the final decision will be the captain's. The Council's function is primarily advisory.

To insure efficient operations, 2 new posts will be introduced: A senior fisherman in charge of fishing operations, and another of fish processing. The chief radio-technician will be in charge of depth-finders, as well as communications and radionavigation.

A new section on fishermen's safety (which did not exist in the previous Manual) will be added. The revised Manual was approved by the Ministry of Fisheries in March 1967 and was scheduled for the printer.

Norway

FIRST-QUARTER 1967 EXPORT TRENDS

Norwegian exports of frozen cod and haddock fillets in first-quarter 1967 were down from the 1966 period. But shipments of coalfish fillets were up--and total shipments of frozen fillets were about the same as in Jan.-Mar. 1966.

In early 1967, exports of canned brisling were running somewhat behind the previous year, when shipments were exceptionally high. Exports of small sild sardines were up about 17 percent. The main canning season for brisling and sild sardines begins in the spring

Exports, Jan.-Mar. 1967

Product	Jan.-Mar. 1967	Jan.-Mar. 1966
	(Metric Tons)	
Frozen fillets:		
Haddock	1,536	1,912
Cod	5,146	7,239
Coalfish	7,152	4,403
Herring	1,956	2,381
Other	1,278	1,395
Total frozen fillets	17,068	17,330
Frozen herring	4,017	4,814
Canned fishery products:		
Brisling	1,584	2,342
Small sild sardines	3,779	3,218
Kippers	830	817
Shellfish	149	285
Other	1,110	1,118
Total canned fish	7,452	7,780
Fish meal	115,250	66,526
Herring oil, crude	13,573	14,853

Norway (Contd.):

Industrial Fish

Exports of fish meal in Jan.-Mar. 1967 were up sharply from the previous year. The large stocks on hand at the start of 1967 contributed to the gain. Landings of fish for industrial purposes continued at a high level in early 1967, and fish meal output was running slightly ahead of the 90,000 tons produced in Jan.-Mar. 1966. The gain was due to larger landings of capelin and mackerel. ("Fiskets Gang," April 27, 1967, and April 28, 1966, and other sources.)

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VESSEL COSTS ARE CUT BY USING STANDARD DESIGN

A Norwegian shipyard says that it cut construction costs of coastal long-liners up to 25 percent by using a standard design for a series of vessels. At first, the concept was rejected by fishing interests, but later they changed their minds.

The first vessels have been delivered and 15 sisterships are expected in the first series. The vessels are 50 feet long, of laminated construction, pressure-impregnated material, and with a 150 hp. motor. A speed of 9.5 knots was reached during trial runs, 2 knots faster than normal for this vessel type. ("Ingenioren's Ugeblad," May 5, 1967.)

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WINS NO. 5 POSITION IN WORLD FISHERIES

Norway replaced the U. S. in 1966 as the world's fifth largest fishing nation.

Her fishermen set an all-time Norwegian record of 2,650,500 metric tons of fish--28 percent above the 1965 catch.

They achieved this despite a two-month ban on fishing for reduction purposes. Their larger herring catches--winter and fat--strengthened a trend that became apparent in 1964. Cod production increased slightly. So did the combined yield of other fish species, due mainly to record catches of capelin and mackerel. The first-hand value of the fish catch reached 1.3 billion kroner; this included 164 million kroner in Government subsidies (7.14 kroner = $1). Greater supplies of fish raw materials and largely satisfactory marketing conditions stimulated increased production in all major fish processing industries. Fish exports rose by nine percent to nearly 1.6 billion kroner. The U. S. share of exports rose to 9.2% from increased deliveries of frozen fillets and fish meal.

The short-term outlook for Norwegian fisheries is promising, but marketing conditions are deteriorating for several major fish products, notably fish meal and frozen fish fillets.

Major seasonal fisheries in first-quarter 1967 have recorded even better results than the 1966 period.

First-Hand Production and Value

The exvessel value of the 2.6 million metric tons reached a record 1,309 million kroner. This included 164 million kroner in State support and transfer to the fishermen of over 100 million kroner from the Herring Price Stabilization Fund.

The bulk of the increased yield resulted from record catches of capelin and mackerel, but substantially increased catches also were recorded for some other major species: notably winter herring, haddock, saithe, fat herring, and sand eel. The yields of dogfish, porbeagle, redfish, Norway pout, and crustaceans continued downward. Due to the world oversupply of fish meal and record stocks at home, Norway banned fishing for reduction purposes during November-December 1966.

Herring and Sprat

Aggregate catches of herring, traditionally largest catch, increased by ten percent to record 1,186,000 metric tons. Herring fishermen received 402 million kroner, price support included, 13 percent above 1965. The increased quantity resulted from larger catches of winter herring, fat herring, and Icelandic herring; this more than compensated for reduced yields from the North Sea and small herring fisheries. About 90% of the herring was caught by purse seiners.

The winter herring fishery remained the single most important coastal fishery. (North Sea herring and mackerel are mainly fished in international waters.) During February-March 1966, 460,900 tons of winter herring

Norway (Contd.):

were landed, over twice the 1965 amount. The bulk was taken by about 300 power-block purse seiners off the west coast.

The North Sea herring fishery yielded 454,900 tons, one-third less than 1965. Contributory causes were a concentration of herring shoals within British fishery boundary in Shetland area during the summer months, and Norwegian ban on fishing for reduction purposes.

Concentration of purse seiners in North Sea during second-half 1966, as in 1965, had immediate effect on participation in Icelandic herring fishery. Total yields in this fishery were 42,600 tons, 21% above 1965. The total yield of fat herring, small herring, and fiord herring was 227,600 tons in 1966, seven percent more than 1965.

The 1966 catch of sprat, raw material for the Norwegian brisling "sardine," was 13,000 tons, 25% above 1965.

Cod Catch Increases

The long-term downward trend in the cod fisheries was reversed in 1965 and a minor increase also took place in 1966. But there is overexploitation of Barents Sea Arctic cod stock--the basis for 2 of Norway's most important seasonal cod fisheries (spawning cod and Finnmark young cod). Unless Norwegian fishing in distant waters is intensified, the improvement in total cod yields may prove temporary. According to an official estimate, the number of sexually mature Arctic cod in the Barents Sea is now only ten percent of the 1957 stock.

The aggregate yield of codfish, roe and liver included, increased 8% in 1966--to 209,700 tons. Its firsthand value, support payments included, reached 272 million kroner, 11.5% above 1965.

The spawning cod fishery yielded 63,500 tons in 1966, one-third more than 1965. The Lofoten area catch, traditionally the fishery's center, was 24,000 tons, compared to 1965's 19,500 tons. Purse seiners continued to be banned in Lofoten, and the number of fishermen continued downward. Catches of spawning cod in other areas in North Norway and off west coast also were better in 1966 than 1965.

The catch of Finnmark young cod (also called capelin cod) increased 8.5% to 47,400 tons. This was due mainly to appearance for second successive year of large schools of capelin off North Norway. Other cod fisheries in Norwegian and distant waters brought 98,900 tons in 1966, 4.2% below 1965.

Other Fish Species

The yield of all species other than herring, sprat, and cod rose over 60% to record 1,242,000 tons. As in 1965, the bulk of increase was produced by the power-block purse seine fleet fishing for capelin, mackerel, and other shoal fish. Catches of capelin reached 379,600 tons, 75% above 1965, the previous record year. A much higher yield would have been possible but for limited reduction plant capacity in North Norway.

The most spectacular gains in all fisheries in 1966 were made in purse seining of mackerel in North Sea. The mackerel fishery yielded 484,300 tons, triple the 1965 catch. Catches of saithe and haddock--together with cod the most important raw materials for fish-freezing industry--increased 7.8% and 24%, to 142,000 tons and 62,400 tons, respectively.

The yield of pout was reduced by more than half, to 25,300, reflecting the purse seiners' concentration on better-paying North Sea herring and mackerel. The catches of all species of crustaceans were significantly lower in 1966, partly due to overfishing. The yields of dogfish, porbeagle, and redfish continued downward.

Disposition of Catch

Deliveries of fish for fresh consumption increased 6.2% to 105,100 tons. Deliveries of winter herring almost quadrupled to 19,900 tons, replacing porbeagle as single most important species for fresh consumption.

The Norwegian freezing industry processed a record 258,700 tons in 1966, 13% more than 1965. This was due to several improved major fisheries and satisfactory marketing conditions abroad during most of 1966. The increased fish deliveries to the freezing industry were largely accounted for by winter herring, spawning cod, haddock, and saithe. Freezing of dogfish and porbeagle was further reduced in 1966, reflecting the downward trend resulting from overexploitation of the fish resources.

Norway (Contd.):

There were greater supplies of cod and related species (cusk, haddock, saithe, ling) and improved marketing situations abroad. So fish deliveries to stockfish and klipfish industries increased significantly in 1966. Total deliveries to the fish drying industry (stockfish) rose 17% to 109,700 tons. The fish salting industry received 106,200 tons of raw fish except herring, or 23% more than 1965; most was processed into klipfish. Herring salting, a major fish industry a decade ago, claimed only 23,300 tons of fish raw material (138,000 tons in 1956), about the same as 1964 and 1965. Fish deliveries to the canning industry increased by one-quarter to 49,000 tons, mainly as a result of increased supplies of small herring, sprat, and winter herring.

As in 1965, the most notable gain in production was recorded by the fish meal and oil industry. Total deliveries of herring, mackerel, and other species to reduction plants increased by more than one-third to record 1,988,900 tons. The entire catches of capelin, Norway pout, and sand eel, 88% of herring, and 95% of mackerel catches were delivered to reduction plants. Deliveries of fish for bait were reduced further in 1966; this reflected shift in gear type used. Hand lines and longlines requiring bait are being replaced gradually by purse seines and gill nets.

Exports, Imports, Marketing Conditions

Exports of fish and fish products increased 9% to 1,556 million kroner in 1966; volume, by 10.7% to 642,900 tons. Fish products were 13.9 percent of exports in 1966--accounted for by larger volumes of fish meal and oil, stockfish, klipfish, and frozen fillets.

Exports of fish meal, the number one fish product in 1966, were 262,700 tons, 4.4% more than 1965. The average export price was 1,322 kroner per metric ton, or 2.6% more than the 1965 average price. This indicates that a substantial part of the exports was sold at the high prices quoted first-half 1966. Exports of fish oil increased from 33,000 tons in 1965 to 80,800 tons worth 97 million kroner in 1966.

Frozen fillet exports rose by only 2.4% to 72,800 tons in 1966; this compared with a 37% increase in 1965. The reduced growth rate reflected mainly the oversupply of fish fillets in the principal export markets. This was offset somewhat by improved marketing conditions for stockfish and klipfish, which utilize the same fish raw materials as the freezing industry. Exports of stockfish and klipfish rose 1.2% and 16% to 26,000 tons and 36,200 tons, respectively. Export of canned fish remained at its 1965 level of about 29,000 tons.

Exports to U. S. increased from 21,200 tons in 1965 to a record 48,200 tons in 1966. The increase was accounted for by fish meal (22,700 tons in 1966, zero in 1965) and frozen fillets (9,800 tons in 1966, 6,200 tons in 1965). In value, the U. S. took 9.2% of exports, in 1966, compared with 6.8% in 1965.

Imports of fish and fish products into Norway were 28,500 tons, double the 1965 figure. The most important fish products imported were sprat and salted cod for the fish canning and klipfish industries, respectively, and salted herring for domestic consumption. Imports from U. S. were, as in 1965, negligible: 3.7 million kroner--3.1 million kroner for 2,100 tons of fish oil.

Prices and Aid to the Fishermen

The average price received by fishermen per ton of winter herring increased from 293 kroner in 1965 to 330 kroner in 1966. This reflects partly high world fish meal prices during first-half 1966, and partly that a substantially larger portion of the 1966 catch of winter herring than in 1965 was marketed fresh, frozen, salted, and canned. All these latter processing industries paid a higher net to fishermen than fish meal and oil industry.

Species	Price in Kroner per Metric Ton		Percentage Change
	1965	1966	%
Halibut	4,308	4,868	+13.0
Spawning cod	1,237	1,326	+ 7.2
Finnmark young cod	1,162	1,224	+ 5.3
Saithe	603	664	+10.1
Mackerel	450	378	-16.0
Tuna	2,423	3,139	+29.1
Dogfish	690	892	+29.3

In 1966, 164 million kroner, 12.5% of first-hand value of catch, was appropriated by the government to support fisheries. No final accounts have been published, but cod and herring fisheries received estimated 56.4 million kroner and 56.1 million kroner, respectively. No price support was paid for reduction purposes. The remaining subsidies,

Norway (Contd.):

or 51.5 million kroner, were used to reduce cost of tackle, bait and modernization.

Outlook

The short-term outlook for production appears promising and is less so for marketing. During first-quarter 1967, total catches of herring, capelin, mackerel, and other shoalfish were 763,000 tons, or 16% more than 1966 period. About 90% of catch was processed by reduction industry. The extraordinarily large stocks of fish meal--primary reason for ban on fishing for reduction purposes last year--were largely sold and shipped from factories by end of first quarter. Judged by the current difficult marketing situation for fish meal, production restrictions also may be necessary this year, especially if mackerel, herring, and other shoalfish continue as bountiful as first quarter. The catching capacity of purse seine fleet increased substantially during 1966 to about 600 units, 400 of them less than two years old.

Total yields of spawning cod and Finnmark young cod--the major cod fisheries during the first quarter--were 58,900 tons, or 2.6% more than one year earlier. About 8,900 tons were processed into fillets, compared with 15,100 tons in first-quarter 1966. This reflected the current oversupply in fish fillet market. According to a spokesman for Frionor A/S, the sales organization of about 120 fish freezing plants, frozen fillets are currently uncompetitive in the European Economic Community. Norway's exports of fresh fish also are declining.

United Kingdom

FISHERY LOAN
INTEREST RATES REVISED

The British White Fish Authority announced that its interest rates on loans made from April 1, 1967 would be:

For fishing vessels of not more than 140 feet, new engines, nets, and gear: on loans for not over 5 years, 7 percent (decrease $\frac{1}{4}$ percent); on loans for more than 5 years but not over 10 years, 7 percent (no change); on loans for more than 10 years but not over 15 years, $7\frac{1}{8}$ percent (no change); on loans for more than 15 years but not over 20 years, 7 percent (decrease $\frac{1}{8}$ percent).

The rate for processing plants on loans for not more than 20 years was set at $7\frac{5}{8}$ percent (decrease $\frac{1}{8}$ percent).

The rates on loans made before April 1 were unchanged. ("Fish Trades Gazette," April 8, 1967.)

Denmark

SHIPYARD COMPLETES 38TH
FREEZER-TRAWLER FOR USSR

With the launching of the M/S "Kovdor" on April 27, a Copenhagen shipyard completed its 38th freezer-trawler for the USSR. The Kovdor is the 17th in a series of 2,500-ton deadweight freezer-trawlers built for the Soviets by the shipyard. The other vessels ranged from 800 to 1,600 tons deadweight.

The Soviets also have a license to build diesel motors designed by the Danish firm. (U. S. Embassy, Copenhagen, May 5, 1967.)

* * *

FUR SEAL PRICES DECLINE
AT DANISH AUCTION

At a fur seal auction in Copenhagen, April 12, 1967, average prices were substantially lower than a year earlier. Also, sales were made for only 78 percent of the skins offered. This was attributed to a general weakening of the market for seal and other fur skins. (U. S. Embassy, Copenhagen, May 17, 1967.)

Iceland

REPORTS FISHERY LANDINGS,
USES AND EXPORTS

In 1965-1966, Icelandic fishery landings by principal species were:

Iceland (Contd.):

Species	1966	1965
	(Metric Tons) 1/	
Cod	231,413	244,001
Haddock	36,028	53,703
Saithe	20,988	24,901
Ling	4,693	5,158
Wolffish (catfish)	8,052	7,599
Cusk	2,107	2,264
Ocean perch	23,109	29,910
Halibut	929	984
Herring	769,152	762,930
Capelin	124,933	49,735
Shrimp	1,790	901
Other	15,250	16,942
Total	1,238,444	1,199,028

1/Weight of whole fish.

Utilization of Principal Landings

How Utilized	1966	1965
	(Metric Tons) 1/	
Herring and Capelin for:		
Oil and meal	802,410	714,709
Freezing	24,923	32,961
Salting	64,602	61,081
Groundfish for:		
Freezing & filleting	163,370	185,409
Salting	82,644	88,832
Stockfish (dried unsalted)	53,977	54,364
Oil and meal	2,171	3,159
Crustaceans for:		
Freezing	5,184	4,416
Canning	63	190
Home consumption	10,791	14,581

1/Weight of whole fish.
Source: "Aegir," March 1967.

Exports of Selected Products

Compared with 1965, Iceland exported in 1966 more fish meal, fish oil, and salted herring, but less frozen fish fillets and stockfish. (Icelandic "Statistical Bulletin," February 1967.)

Icelandic Exports of Selected Fishery Products, 1965-1966

Product	1966			1965		
	Qty.	Value f.o.b.		Qty.	Value f.o.b.	
	Metric Tons	1,000 Kr.	US$ 1,000	Metric Tons	1,000 Kr.	US$ 1,000
Salted herring	42,217	581,814	13,512	39,027	491,054	11,404
Other salted fish	28,165	546,765	12,698	31,912	545,137	12,660
Stockfish	8,745	309,882	7,196	12,243	375,944	8,731
Herring, frozen	26,200	169,521	3,937	25,621	184,033	3,809
Fish fillets, frozen	40,952	1,059,495	24,605	49,125	1,148,033	26,661
Shrimp & lobster, frozen	1,274	179,637	4,172	1,002	129,810	3,015
Fish and whale oil	129,298	908,657	21,102	85,238	705,811	16,391
Fish meal	172,305	1,262,590	29,322	147,161	1,100,995	25,569

Note: Values converted at rate of 1 krona equal 2.32 U. S. cents.

NEW UNDERSEA FEATURES IN GREENLAND SEA AREA REVEALED

A scientific treatise entitled "Bathymetry of the North Greenland Sea," published by the U. S. Naval Oceanographic Office, shows for the first time the part of the Mid-Atlantic Ridge that is in the Greenland Sea. It is part of a 40,000-mile long range of underwater mountains that circles the earth.

The Mid-Atlantic Ridge was previously thought to extend through the Greenland Sea because of the number of earthquakes that occurred in the area. The north-south mountain system in the Greenland Sea has the typical rift valley--the bottom of which is over 10,000 feet. The Ridge is offset by a fracture zone, the bottom of which is at approximately 14,000 feet. This fracture zone suggests that Vestspitsbergen was once north of Greenland and that by continental drift, the two islands moved apart. Another fracture zone located between the Mid-Atlantic Ridge and Greenland separates two small, very flat plains with a 1,500-foot difference in level.

Surveys done previously in the Greenland Sea area (some as far back as the early 1900's) are also summarized in the study made by the Naval Oceanographic Office.

ASIA

Japan

POLE-AND-LINE TUNA FISHING IS GOOD OFF JAPAN

Good pole-and-line skipjack tuna fishing prevailed in mid-May off the Japanese coast of Choshi, Chiba Prefecture (east of Tokyo). Catches of around 400 metric tons were landed daily at Yaizu. Most of the fish were small, around 4.4 pounds, but the quality was good--and local packers bought at exvessel 72-75 yen a kilogram (US$181-189 a short ton). However, the yield from such small fish was low, and the packer's profit was said to be very small.

Pole-caught albacore tuna catches off Japan also were reported good. Landings at Yaizu and Shimizu totaled around 200 tons a day. Prices were holding at about 155-165 yen a kilogram ($391-416 a short ton). ("Kanzume Nippo," May 18, 1967.)

* * *

TUNA PRICES STRENGTHEN

Japanese albacore tuna export prices, which declined steadily since late 1966 began to show signs of reversing that trend in early May as U. S. packers showed some buying interest. Export prices for ship-frozen round albacore (which dropped to around $440 a short ton c.i.f. from the fall 1966 high of $555 a short ton c.i.f.) were believed stabilized. They are expected to move up gradually as the export market recovers with the improvement in U. S. canned tuna sales.

Japanese summer albacore, quoted at 140-160 yen a kilogram exvessel ($353-403 a short ton) in Japan, are expected to sell for around $405-410 a short ton c.i.f. to the U.S. market. The Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN) plans to begin buying summer albacore if prices drop below 140 yen a kilogram.

Atlantic-caught frozen gilled & gutted yellowfin for export to Italy in early May sold at around $450-470 a metric ton c.i.f., but the market was reported soft. ("Suisan Tsushin," May 15 & 12, 1967; "Suisancho Nippo," May 10, 1967.)

* * *

TUNA IMPORTS INCREASED IN FY 1966

Japanese imports of tuna and tuna-like fish in fiscal year 1966 (April 1966-March 1967)

Country of Origin	Quantity	Value
	Metric Ton	US$
Okinawa	5,169	2,059,536
Formosa	1,930	717,831
South Korea	1,343	385,050

totaled 10,796 metric tons worth US$3,795,822, an increase over FY 1965 imports. Purchases from Okinawa, Formosa, and South Korea comprised 80 percent. ("Suisancho Nippo," April 18, 1967.)

* * *

CANNED TUNA IN BRINE PRICES DOWN

The Japan Tuna Packers Association, May 16, established these standard prices for canned tuna-in-brine exports to the U. S. in business year 1967 (April 1967-March 1968):

Can & Case Size	New Base Price	Old Base Price	Net Price Decrease
	. . . . .(US$/Case f.o.b. Japan)		
White meat:			
7-oz. 48's	10.20	11.50	1.30
13-oz. 24's	10.00	10.80	0.80
4-lb. 6's	11.65	12.65	1.00
Light meat:			
7-oz. 48's	8.15	9.15	1.00
13-oz. 24's	7.80	8.60	0.80
4-lb. 6's	9.40	10.40	1.00

Source: "Suisan Tsushin," May 17, 1967.)

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NORTH PACIFIC SALMON PRICES ARE UP

The Japan Federation of Salmon Fishermen's Association (NIKKEIREN) and the Northern Water Mothership Council reached agreement May 7 on 1967 prices for fresh and frozen salmon to be delivered by catcher vessels to motherships:

Species	Price 1967	Price 1966	Percentage Increase
	. . .(Cents/Lb.) . . .		%
Red	31.3	31.3	0
Chum	19.2	17.9	7
Pink	14.9	14.4	3
Silver	20.9	19.6	7
King	20.9	19.6	7

Japan (Contd.):

The price increase for 1967 is reported the lowest in recent years. However, earnings per vessel this year are expected to increase by around 800,000 yen (US$2,200) above 1966--due to allocation of larger quotas to catcher vessels and anticipated good harvest of pink salmon. An early good run of Alaskan reds also is predicted.

Fishing Armada Sails

Eleven salmon motherships, accompanied by 369 catcher vessels, departed Hakodate May 15 for the North Pacific. They were expected to reach the fishing grounds around May 20.

The 1967 quotas allocated to mothership and land-based fleets are: Area A (north of 45° N. latitude) 52,500 metric tons (48,000 tons in 1966, 56,000 tons in 1965); Area B (south of 45° N. latitude) 55,500 metric tons 48,000 tons in 1966, 59,000 tons in 1965); total, 108,000 metric tons. ("Suisan Tsushin," May 16; "Nihon Suisan Shimbun," May 10, 1967, and other sources.)

* * *

BILL SEEKS TO REGULATE FOREIGN FISHING

A bill to regulate port calls and fishing in Japanese waters by foreign nationals was introduced in the Diet on April 26--"in view of the recent trends in fishing operations conducted by foreign nationals." The measure would authorize the Minister of Agriculture and Forestry to grant permits for exceptions and transshipping. Foreign vessels would be allowed to come into port without a permit to avoid disaster, deliver routine freight shipments, and to deliver catches that would not "hinder the maintenance of normal order in the fisheries of our country." The Minister could deny a permit to enter port if this "will increase the fishing potential of the foreign fishing vessel."

Penalties for violations include imprisonment at hard labor up to 3 years, a $500 fine, confiscation of vessel, gear, and catch--or an equivalent value in fines if confiscation is not feasible. (Fishery Attaché, U. S. Embassy, Tokyo, May 12, 1967.)

* * *

TO GILL NET HERRING IN BERING SEA AND SALMON IN ARCTIC OCEAN

The Japanese Fisheries Agency issued a one-year license on May 10 to the Hoko Suisan Company to fish salmon experimentally in the Arctic region and to gill net herring in the Bering Sea north of 58° N. latitude and east of 170° W. longitude (northeast of Pribilof Islands).

On May 12, the firm sent the "Dairin Maru No. 10" (299 gross tons) to the Bering Sea to fish herring with gill nets in order to determine the feasibility of using these nets. The vessel was scheduled to fish herring until June 20, then proceed to the Arctic for salmon fishing. Three other fishing firms also applied for similar licenses, but the Agency authorized only Hoko Suisan. The results of the trip will be made available to the other 3 firms. Hoko Suisan initiated the Arctic salmon operation in 1966 with the 204-gross-ton "Dairin Maru No. 8." ("Minato Shimbun," May 14, 1967.)

* * *

LICENSES EXPERIMENTAL TRAWLING IN EASTERN PACIFIC

The Japanese Fisheries Agency licensed 3 factory mothership fleets on May 22 to conduct experimental trawl fishing in the eastern Pacific--east of 135° W. longitude between 50° N.-10° N. latitudes (Canada to Central America) from September 1, 1967-August 31, 1968. The 3 fleets are: "Yuyo Maru" (5,043 gross tons) with 6 catcher vessels, operated by Taiyo Fishing Company; "Kashima Maru" (7,163 gross tons) with 11 catcher vessels, operated by Nihon Suisan; and "Kazushima Maru" (3,757 gross tons) with 6 catcher vessels, operated jointly by Hoko Suisan and Hokoku Suisan.

The fleets will fish for hake, cod, Alaska pollock, and Pacific Ocen perch. Combined production targets are 102,900 metric tons of hake, Alaska pollock and cod, and 25,900 tons of Pacific Ocean perch. Catches will be either frozen or processed into fish meal and mince meat (ingredient for fish sausage) aboard the factoryships. Most of the area within the designated zone has never been trawled before by Japanese vessels. In 1966, the Agency licensed 3 trawlers to fish experimentally in the northwest Pacific east of

Japan (Contd.):

135° W. longitude and north of 30° N. latitude, but the operations reportedly were not successful.

Agency Sets Conditions

In licensing the operation, the Agency stipulated these conditions: (1) fleet operators will observe provisions of the Japan-U. S. fishing agreement relative to the U. S. 12-mile exclusive fisheries zone; (2) exploratory operations will follow procedures established by the Agency; and (3) operations will be conducted outside regulatory areas designated in U. S.-USSR fishery agreement on U. S. 12-mile zone. ("Suisan Tsushin," May 30, 1967, and other sources.)

* * *

FIND POSSIBLE YEAR-ROUND TUNA FISHERY OFF MARSHALL-CAROLINE ISLANDS

The Japanese fishery guidance vessel "Chiba Maru," 495 gross tons, owned by the Chiba Prefectural Government, returned recently to Misaki from a 3-month exploratory trip to the central-west Pacific off the Marshall and Caroline Islands. Its purpose was to determine practicability of starting a tuna fishery in offshore waters of those islands.

On the trip, 130 metric tons of fish (unidentified) were taken in 70 sets, averaging 1.8 tons per operation. This exceeded expectations somewhat and indicated possibility of a year-round fishery. The survey also revealed that the relative proximity of the area to home islands eliminates need to stop at foreign ports and saves 170,000-200,000 yen (US$47-56) in port entry fees. ("Suisan Keizai Shimbun," May 9, 1967.)

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VESSEL LICENSE RENEWALS SCHEDULED

The Japanese Central Fisheries Coordination Council, an advisory body on licensing and regulation of fisheries, agreed April 21 on standards and regulations of the Fisheries Agency for nationwide license renewals during May 1 to July 31. During this period, all owners of vessels operating in 8 designated fisheries must file license renewal applications, according to "Suisan Keizai Shimbun," April 24, 1967.

The number of vessels to be licensed for the designated fisheries for the 5-year period September 1, 1967-August 31, 1972, are:

Designated Fishery	No. Vessels Permitted Operation
Offshore trawl fishery	154
Isei (west of 130° E.) medium trawl	710
Distant-water trawl fishery:	
Southern waters	91
Northern waters	218
Northern water long line-gill net	22
Mothership-type trawl fishery:	
Bering Sea--motherships	12
" " catcher vessels	226
Okhotsk Sea--motherships	3
" " catcher vessels	39
Distant-water tuna fishery	1,287
Offshore tuna fishery	1,678
Mothership-type tuna fishery:	
Motherships (over 450 gross tons)	39
Portable boats (under 20 gross tons)	102

* * *

FISHING VESSEL CONSTRUCTION ROSE IN FY 1966

In fiscal year 1966 (April 1966-March 1967) 1,158 vessels totaling 174,759 gross tons were licensed for construction. The data were compiled by the Japanese Fisheries Agency's Fishing Vessel Section. There were 612 steel vessels (154,397 gross tons) and 546 wooden vessel (20,362 gross tons), up 43 percent in number and 81 percent in total tonnage over FY 1965. The increases were 10 percent in number and 55 percent in tonnage above average for the past 10 years.

The sharp rise in FY 1966 is attributed to: construction of many replacements for vessels built in 1961-63; and construction of new vessels by firms that anticipated the Government would not revise standards for the general renewal of vessel licenses scheduled for May-July 1967. Construction in FY 1966 trended towards an increase of vessel size in all fisheries. In tuna fishery, most of newly built steel vessels were in 200- to 300-ton class. ("Suisan Keizai Shimbun," May 2, 1967.)

* * *

FORM NATIONAL SQUID COUNCIL

A new Japanese squid organization, tentatively named All-Japan Squid Fishery Council, was formed in Tokyo on May 11. It was created to promote domestic production to

Japan (Contd.):

meet growing demand for squid in Japan--and to cope with problems arising from growing imports of squid and extension of Soviet squid fishing into waters off Hokkaido.

Japan's annual squid production in recent years has been around 500,000 metric tons. ("Minato Shimbun," May 7, 1967.)

* * *

GOVERNMENT RESEARCH VESSEL LAUNCHED

The Japanese Fisheries Agency's new research vessel, the 3,200-gross-ton, 71-man "Kaiyo Maru," largest of its kind in Japan, was launched on April 24 at the Kanasashi Shipyard in Shimizu. The vessel is a stern trawler type designed for deep-water trawling and capable of operating under all climatic conditions. She will carry a portable boat to operate drift-net, surrounding-net, and long-line gear. Completion is scheduled for September 10.

Specifications: total length 84.65 meters (262.4 feet); beam 15 meters (49.2 feet); draft 9.2 meters (30.2 feet); speed about 13.5 knots. ("Suisan Keizai Shimbun," May 1, 1967.)

* * *

TAIYO CO. WILL FISH TANNER CRAB IN BERING SEA

Taiyo Fishing Co. plans to conduct experimental tanner crab fishing this year in the Bering Sea with the Banshu Maru No. 5 (3,678 gross tons). The vessel, assigned to the Bering Sea gill-net herring fishery, also will harvest the unutilized tanner crab resource in Bristol Bay and other Bering Sea areas.

Production target is 100-150 tons of frozen crab meat. If this operation is successful, Taiyo plans to send a canning factoryship to the Bering Sea for full-scale operations aimed at producing annually 375,000 cases (48 ½-lb. can) of canned crab meat for export. ("Suisan Keizai Shimbun," April 17, 1967.)

* * *

POLLUTION DAMAGE TO FISHERIES IS RISING SHARPLY

The Japanese Fisheries Agency reports that water pollution damage suffered by the coastal fisheries in 1965 reached an estimated 12.7 billion yen (about US$35.3 million). This corresponds roughly to 5 percent of production value. The figure is based on damages caused by industrial waste, city sewage, oil and bilge water from vessels, discharges from refineries, pulp factories, and other plants. It does not include contamination from human waste, agricultural chemicals, and numerous unknown pollutants. Total pollution damage is considered to be far greater than the Agency's figure.

The rapidly increasing pollution of water parallels the economic growth of Japan. The problem is said to nullify coastal fishery improvement projects, such as construction of artificial reefs, being carried out with a government subsidy. In 1958, the Government enacted a water quality control law to protect coastal fishery resources, but it has failed to control pollution. Growing public concern over water contamination has led the Government to draft pollution control measures, which will be submitted to the current Diet. However, observers believe, because of the strong opposition of certain industrial groups, and jurisdictional arguments among government agencies, there is little hope of passing any effective conservation meaures sought by the fishing industry.

Over 1,000 members of the National Fishermen's Council for Water Pollution Control Measures were scheduled to assemble in Tokyo, May 9, to demonstrate against the Government's ineffective control measures and to demand protective legislation. ("Shin "Suian Shimbun," May 8, "Nihon Shimbun," May 5, 1967.)

* * *

PLAN TO STABILIZE ALBACORE TUNA PRICE

The Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN) plans to purchase albacore tuna if prices decline below a certain level. It will do this in an effort to stabilize tuna prices in view of prospects of a good summer pole-and-line albacore season and the gloomy outlook on canned tuna exports.

Japan (Contd.):

NIKKATSUREN will buy 5,000 metric tons of summer albacore: 2,000 tons will be frozen and stored, and 3,000 tons processed into canned tuna in oil for sale in Japan. The group will pay packers about 50 yen (about 14 cents) per case to process the raw material. It will have the major trading firms and wholesalers sell the product in Japan.

However, this plan is reported meeting opposition from packers anticipating a decline in albacore prices. Some packers claim they cannot cooperate in a program that would result in increasing their raw material costs. Packers normally process in a year about 25,000 tons of summer albacore. Since NIKKATSUREN would be unable to carry out its program without packers' cooperation, it hopes to explain its program to packers and distributors, and to tuna producers.

Plans Greater Efforts

The group plans to intensify its price stabilization efforts this year because predictions are for over 30,000 tons of summer albacore landings. It appears likely that albacore price will decline considerably in view of present frozen and canned tuna exports and tuna price developments in other countries.

NIKKATSUREN's idea of stabilizing tuna prices by promoting domestic sales of canned albacore in oil was developed in 1965. That year saw excellent summer albacore landings (around 43,000 tons) produce sharp price reductions. However, in 1966, summer albacore prices soared to nearly 200 yen per kilogram exvessel (US$504 a short ton) in Japan. This was due to light landings of under 20,000 tons. As a result, packers declined to put up albacore for domestic sale. Only about 4,000 cases of canned albacore in oil were sold in 1966 under NIKKATSUREN's domestic canned tuna promotion program. ("Kanzume Nippo," April 24, 1967.)

* * *

SETS 1967 QUOTA FOR NORTH PACIFIC WHALING

On April 14, the Japanese Government announced a whale catch quota of 1,001 blue-whale units for the 16th (1967) North Pacific Whaling Expedition; it is the same quota as 1966. The catch limit for fin whales, however, was reduced by 11 percent, to 1,126 whales.

On April 22, the Fisheries Agency licensed the operation of 3 whaling fleets scheduled to participate in the 1967 expedition. The catch targets assigned to them are:

Name of Firm	Whaling Fleet	Catch Quota
		Blue-Whale Units
Kyokuyo Hogei	"Kyokuyo Maru No. 2"	467
Taiyo Gyogyo	"Nisshin Maru"	267
Nihon Suisan	"Tonan Maru"	267

Scheduled fleet departures were: Nisshin Maru May 12; Kyokuyo Maru No. 2 May 13; Tonan Maru May 15. ("Suisan Tsushin," April 24; "Suisan Keizai Shimbun," April 17, 1967.)

* * *

A YEAR-ROUND FISHERY OFF U. S. WOULD POSE PROBLEMS

The Japanese trawler "Taiyo Maru No. 32" (364 gross tons), owned by a Taiyo Fishing Co., returned to Japan April 28 after a 5-month exploratory trip off the U. S. east coast. The vessel explored the area from 10° N. (West Indies) to 40° N. latitudes (New York), seeking primarily sea bream and shrimp. Its objective was to investigate possibilities of establishing year-round trawl operations in the northwest Atlantic, based on Taiyo's plans to fish north of 40° N. latitude in the summer and south of 40° N. in the winter.

It found herring abundant off New York, but the poor results in shrimp and sea bream fishing indicated the difficulty of setting up a profitable trawl fishery. However, a decision on year-round operations will not be made until the "Kaimon Maru" (2,500 gross tons), recently sent to northwest Atlantic by Japan Overseas Trawlers Association, completes her survey. ("Shin Suisan Shimbun," May 8, 1967.)

* * *

1966 FISHERY CATCH WAS RECORD

The Japanese fishery catch in 1966 hit a record of 7.07 million metric tons--up 160,000 tons, or 2.3 percent, from the 1965 catch of 6.91 million metric tons. This information

Japan (Contd.):

was published by the Ministry of Agriculture and Forestry on May 23.

By type of fishery, the distant-water accounted for 1.7 million tons; offshore fishery 2.99 million tons; coastal fishery 1.86 million tons; shallow-water culture 380,000 tons; and inland water fishery 140,000 tons.

Production increase was attributed largely to good catches in the pole-and-line skipjack fishery, 170,000 tons--up 28 percent over 1965--and the North Pacific mothership-type trawl fishery, 540,000 tons, up 25 percent.

Tuna production by the distant-water longline fishery, 400,000 tons, fell 8 percent below 1965 landings. This was due primarily to poor fishing conditions in the Atlantic Ocean. Whale production totaled 3,445 blue whale units (BWU), a 34-percent decrease from 5,230 in 1965. The sharp decline was attributed mainly to the drastic reduction in Japan's whale catch quota for the 21st (1966/67 season) Antarctic Whaling Expedition (from 2,340 BWU in 1965/66 to 1,633 BWU in 1966/67.) ("Suisan Keizai Shimbun," and "Minato Shimbun," May 25, 1967.)

* * *

SAURY FISHERMEN FORM ASSOCIATION

The Japanese National Saury Fishermen's Association was formed on May 18. Its objectives are to help the economically depressed saury fishermen and to improve their competitive position in view of expanding Soviet fishing operations off northeastern Japan.

This year, the Association will: (1) expand resource investigations and improve fishing condition forecasts; (2) explore and develop new fishing grounds; (3) conduct research to develop labor-saving devices; (4) seek revision of present laws to obtain more benefits for saury fishermen; and (5) accumulate more knowledge about Soviet fishing activities off Japan. ("Shin Suisan Shimbun Sokuho," May 19, 1967.)

* * *

LOOK TO NORWAY FOR NEW SUPPLIES OF FISH

Norwegian newspapers reported that several Japanese processors expressed interest in using capelin for human consumption during a visit. Samples of frozen Norwegian capelin reportedly are being sent to Japan. Last year, the Norwegian capelin catch went entirely for meal and oil. (U. S. Embassy, Copenhagen, May 19, 1967.

Communist China

FISHES FOR TUNA IN INDIAN OCEAN

The tuna fisheries of the People's Republic of China seem to be in the infant stage, reports a visitor to the Canton Trade Fair (April 15-May 15). A few tuna vessels of the 350-ton class from Canton are operating in the Indian Ocean. They probably will turn to the Atlantic Ocean in the future.

At present, the tuna are sold frozen to Europe. It is possible that the Chinese may begin to can tuna in the future.

South Vietnam

FISHING INDUSTRY GREW APPRECIABLY IN DECADE

The fishing industry of South Vietnam is very important to the country's economy because of its current size, growth rate, and potential.

The industry is producing each year 380,000 metric tons of fish, shellfish, and other aquatic products. This is the main protein source for much of the population. The fisheries employ 250,000 people, about three percent of the civilian force.

Most of the catch comes from marine waters along 2,600 kilometers of coast. Inshore areas yield fish, shrimp, lobsters, and other shellfish. Rivers and canals supply much freshwater fish. Pond fisheries produce about 20 percent of the country's catch.

South Vietnam (Contd.):

Industry Growth

The fishing industry has grown encouragingly in the past decade, mostly through mechanization of fishing boats. In 1966, 16,700 of about 65,00 fishing boats were motorized. The catch increased from 52,000 tons in 1954 to 380,500 tons in 1966--287,000 tons came from marine waters, and 65,000 tons from fresh waters. Shellfish catch was 28,000 tons. The war--and the resulting diversion of fishing vessels to public transportation--has slowed that growth somewhat in the last few years.

Industry Has Good Potential

The construction of cold storage and ice-making plants, fish-landing piers, fish culture stations, mechanization of fishing junks and the use of synthetic nets--all these will help the industry fullfill its potential as a leading factor in the economic development of South Vietnam.

The development programs for the industry are a cooperative undertaking of the Government and the U. S. Agency for International Development (USAID). Plans for a continued and progressive use of fishery resources have been made, and effective technical guidance in advanced fishery techniques is being provided. It is hoped that training of fishermen and fishing specialists, and the procurement of essential equipment and supplies, will lead to optimum production from marine and fresh-water waters.

* * *

RECEIVES FISHERY AID

The U. S. has agreed to contribute US$2,012,000 to the Food and Agricultural Organization (FAO), under the Freedom from Hunger Campaign, to assist a U. N. Development Program (UNDP) fisheries project in South Vietnam.

Under the agreement, the U. S. aid will help expand the scope of the project FAO is carrying out for the UNDP at Viet-Nam's request. Recent experience in the South China Sea indicated that a great increase in fish catch would be possible if traditional Vietnamese coastal operations could be modernized and expanded to include deep-water operations. Since fish provide a large portion of the protein in the Vietnamese diet, this project could result in a much needed improvement in the food supply.

UNDP Project Is Broadened

The original UNDP project, calling for $1 million from the Special Fund and $336,000 as Viet-Nam's counterpart contribution, consisted of coastal surveys and feasibility studies. The U. S. contribution will pay for investigations and feasibility studies for offshore and high-seas operations. It will enable FAO to pay for the charter of a deep-water trawler, necessary equipment, and personnel, including a U. N. expert.

The Netherlands also plans to contribute to this enlarged project. (U. S. Department of State, May 26, 1967.)

Taiwan

TUNA VESSELS WILL TRANSSHIP FROM SOUTH AFRICA

The Walvis Bay harbor is to be used by 6 fishing vessels (five 300-gross tons and one 1,000-gross ton) of the Republic of China to transship tuna catches. The vessels are all fishing off coast of southwestern Africa and are registered in Taipei (Taiwan). Mainly, they long-line for tuna beyond the Continental Shelf off Southwest Africa. ("Namib Times," April 21, 1967.)

SOUTH PACIFIC

Australia

FISHERY EXPORTS AND IMPORTS, JUNE-DECEMBER 1966

Australian shrimp exports for July-December 1966, the first half of the 1966/67 fiscal year (July-June), were worth US$1,875,000--up 58 percent over the same period in 1965/66. This was reported in "Australian Overseas Trade in Marine Products," published by the Fisheries Branch, Commonwealth Department of Primary Industry.

The quantity of shrimp exported for the half-year was 1,755,000 lbs.--533,000 lbs. more than July-December 1965.

A feature of trading was the sharp increase in exports to the U. S.--154,000 lbs. valued at $189,000, compared with 63,000 lbs. worth $54,000 in the 1965/66 half year to December 31. Japan remained Australia's best customer, importing 1,132,000 lbs. valued at $1,250,000.

Abalone exports also rose in quantity and value during the half-year. The 1,077,000 lbs. of meat were worth $551,000, a rise of 73 percent over the 1965 period. Of that amount, canned abalone was worth $401,000. Malaysia, Singapore, and Japan took the bulk of exports.

But Total Value of Exports Dropped

Total value of marine products exported for the 6 months to December 31, 1966--$10,247,000--was $208,000 less than the 1965 period. This was due mainly to a 30 percent drop in value of spiny lobster tail exports. Lobster tail shipments for the first half-year in 1965/66 were particularly heavy because of a carryover from the previous year due to shipping difficulties. Exports for the 6 months to December 31, 1966, were valued at $3,838,000, compared with $5,482,000 the previous year.

Scallop exports dropped by $24,000 in December but were up by $25,000 for the 6-month period.

The value of cultured pearl exports for the half-year was $1,732,000--up $552,000.

Marine Products Imports Down A Little

There was a slight fall in the value of marine products imports for the half-year ended December 31, 1966. They totaled $17,562,000, compared with $17,680,000 for the first 6 months in the 1965/66 year.

The value of fish fillet imports in packages of one pound or less jumped 81 percent to $2,855,000, but imports of similar fish in packs greater than one pound fell 4½ percent, to $1,972,000. ("Australian Fisheries Newsletter," April 1967.)

American Samoa

ALBACORE PRICES RAISED FOR JUNE DELIVERIES

The price agreement reached between Japanese trading firms and U. S. packers in American Samoa for June 1967 tuna deliveries resulted in a $10-per-ton increase for albacore: $350 per short ton for frozen round fish and $335 per ton for iced fish.

Other tuna prices for June (with May price comparisons): yellowfin frozen $290 (down $5), iced $275 (unchanged); big-eyed frozen $185 (up $5), iced $170 (unchanged). ("Suisancho Nippo," June 3, 1967.)

* * *

ASIAN TUNA PRODUCERS TO PARTICIPATE IN SAMOAN PRICE TALKS

The 8-man tuna price study group, formed after the Asian tuna conference in Tokyo, May 30-31, held its first meeting June 3. It adopted the following proposals: (1) representatives from Formosa, South Korea, and Okinawa will take part in the monthly tuna price negotiations in American Samoa between Japanese trading firms and U. S. packers; (2) the Japanese firms will handle direct negotiations but reflect the will of tuna producers of the 4 participating countries; (3) a determination of price will be considered the decision of the 4 countries; and (4) when non-Japanese members cannot attend the negotiations, the Japan National Federation of Tuna Fishermen's Co-

American Samoa (Contd.):

operative Associations (NIKKATSUREN) will notify them of the price settlement.

On June 5, NIKKATSUREN informed the concerned Japanese firms of the new plan. ("Suisancho Nippo," June 6, 1967.)

CARIBBEAN

Barbados

SHRIMP INDUSTRY GROWS

For one seafood company, 1966 was a successful year. It exported about 2.4 million pounds of shrimp, principally to the U. S. During 1967, the company will export an estimated 3 million pounds and, during 1968, 3.5 million.

During 1966, another firm began to build a $160,820 facility to peel and devein shrimp; 150 new employes will be needed. When completed in June 1967, cold-storage facilities will be provided for 300,000 pounds of shrimp, and processing capacity will be 30,000 pounds a day. The firm shipped a few thousand pounds of shrimp to the U. S. by air last year but, according to company officials, the cost was too high to do this routinely. It also tried to export flyingfish to the United Kingdom in small quantities, where the product was fairly well received. However, there are no immediate plans to pursue this activity on a large scale because the company is handling all it can now.

The shrimp trawler fleet is scheduled to be expanded from 24 vessels to over 35 by July 1967. With increased storage capacity, the fleet could be expanded to 100 vessels--but there is a shortage of docking space. (U. S. Embassy, Bridgetown, Apr. 25, 1967.)

CRAYFISH DESCRIPTION AND THEIR HABITS

Crayfish, lobsters, shrimp and crabs are relations in the class "crustacea," all bearing 2 pairs of antennae and at least 5 pairs of legs. The head and thorax of these marine animals are fused into one piece, called the cephalothorax, and form a protective sheath over the animal. This sheath, or crust, suggested the class name "crustacea."

Crayfish are abundant in streams and freshwater ponds of all the continents, wherever there is a sufficient amount of calcium carbonate in the water. Some live in rapidly flowing streams and others, also called crawfish, live in stagnant ponds or in wet meadows and marshes.

Crayfish lurk patiently under flattish stones, with just their heads protruding from their hiding places. Two pairs of waving antennae--one pair short and the other pair long and slender--keep tabs on passing visitors. When a small fish or other tasty creature passes within reach, the crayfish grabs it with his pincer claws.

When its watery world is calm and quiet, the crayfish crawls forward around the bottom slowly and jerkily. But if disturbed, it shoots backward rapidly by contracting its abdominal muscles and folding its tail fin underneath its body. It is to this swift ability to retreat that a person refers when he says someone has "crawfished" out of an undertaking. (Reprinted, with permission from Science News, weekly summary of current science, copyright 1966 by Science Service, Inc.)

AFRICA

South-West Africa

FISH OIL YIELD DROPS

The quality of pilchards caught off Walvis Bay in early May deteriorated, and the oil yield dropped from about 20 gallons a ton of fish at the beginning of April to only nine. This is a marked change in the usual pattern of oil yield, which rises sharply during May and June and declines again in July. The fish were found very close inshore. Vessels had been going out for up to five hours for fish. ("Namib Times," Walvis Bay, May 5, 1967.)

Senegal

SETS TUNA PRICES

The Government of Senegal, on March 18, 1967, issued a decree governing the 1966/67 tuna fishing season. The basic provisions carry over from the 1965/1966 season: tuna prices remain at 82.50 francs CFA ($0.34)/Kg. ($340 a metric ton) for albacore, and 55 francs CFA ($0.22)/Kg. ($220 a metric ton) for skipjack.

The French import quota of 11,000 tons of canned tuna from Senegal continues to be allotted among Senegal's 3 canneries. (U. S. Embassy, Dakar, April 22, 1967.)

Mauritania

DEVELOPS FISHING INDUSTRY

Mauritania is pushing a vigorous fishery development plan with financial assistance from France and Spain, according to the Japanese Fisheries Agency. Mauritania plans to construct in Port Etienne a 1,800-ton cold-storage plant (with 75-ton freezing capacity), a fish meal plant with a processing capacity of 300 tons of fish a day, and a 280-meter-long fish unloading wharf. Also, a fishing fleet build-up program is reported under way.

In the first phase, a fleet of 16 fishing vessels (14 reported under construction) will be built: two 52-meter (170-foot) trawlers and six 33-meter (108-foot) trawlers powered by 1,300-hp. engines; six 21-meter (69-foot) purse seiners powered by 360-hp. engines; and two 2,000-ton refrigerated carriers. Construction of vessels and plants are to be financed by France. ("Nihon Suisan Shimbun," May 17, 1967.)

Ghana

REPORT ON FISHING INDUSTRY

Ghana's current demand for fish outdistances the available supply considerably. The Fisheries Division, Ministry of Agriculture, estimates the present annual demand at 250,000 metric tons. Its provisional figure for supply from all sources is 130,000 tons, perhaps optimistic. While official predictions suggest a slight increase in fish production and consumption in 1967, the gap between supply and demand is not expected to narrow significantly.

The 1966 catch was 99,236 tons, an increase of 10,554 tons over 1965. Canoe landings accounted for 25,115 tons; motor fishing vessels, 49,350 tons; and Soviet vessels on contract, 24,776 tons. More than half the increase resulted from an improved tuna catch--from 7,716 to 13,196 tons.

In 1966, 18,930 tons of fish were imported (5,699 tons in 1965), while fish transshipped out of Ghana amounted to 7,794 tons (6,869 tons in 1965). Figures for the 1966 fresh-water catch are not available, but the amount must be small. The largest source for this type of fish is, of course, the Volta Lake, which currently supplies about 300 tons annually.

20% of Work Force in Fishing

About 20 percent of Ghana's working population is engaged in some aspect of fishing; 67,000 fishermen operate 10,212 canoes, half fitted with outboard motors. Also, 412 local motor fishing vessels (32' to 100' total length) ply Ghana's waters. Most fish are purchased, smoked or dried, and later marketed by women hawkers. Some are frozen on the 18 Soviet trawlers leased to Mankoadze Fisheries, and at the State Fishing Corporation's modest-

Ghana (Contd.):

sized freezing facility in Tema. In theory, 50 percent of the fish marketed by this state-owned corporation is transported inland in a limited number of refrigerated trucks. But numerous newspaper complaints regarding empty cold-storage houses in noncoastal areas suggest strongly that most fish are consumed near the country's two ports, Tema and Takoradi. Star-Kist International, at Tema, fishes exclusively for tuna, all exported.

Industry Has Great Potential

The fish industry, if properly encouraged and managed, could hold great potential for Ghana. The internal demand for fish, currently twice the domestic and foreign supply, should encourage increased production. While Ghanaian marine grounds are not considered abundant, efficient exploitation would increase the yield.

The U. S. Agency for International Development, working with the Ghana Government, is exploring ways to take advantage of the fresh-water fish resources of the Volta Lake.

Fish production could be encouraged by reducing tax on fish, originally imposed for revenue purposes. Currently, a $1.40 tax must be paid for each ton of fish with an overall length greater than 20 centimeters; 5 percent ad valorem is levied on loads of shorter lengths. Also, a port fee of 93 cents per ton and an identical wharfage fee is exacted from all vessels in port.

If the overcapitalized State Fishing Corporation were sold to private ownership, a move now under consideration, production could be expected to rise, distribution improve, and spoilage decrease. With sufficient private investment and know-how, shrimp exploitation for immediate freezing and air shipment to Europe could prove profitable. The shrimp grounds, thought substantial, should be thoroughly investigated and delineated. (U. S. Embassy, Accra, June 8, 1967.)

FAO NEEDS FISHERY TECHNICIAN

The Food and Agriculture Organization (FAO) has an opening for a Fishery Statistician (P-2) in its Rome office. This is a permanent appointment with a gross starting salary of $9,050 plus allowances. Qualifications include a university degree in statistics and mathematics, and post graduate studies in these disciplines; three years' experience as a statistician; and a very good knowledge of either English, French, or Spanish. Interested persons should send application with detailed personal history to Chief, Recruitment Section, Personnel Branch, FAO via delle Terme di Caracalla, Rome, Italy.

ARTICLE

If you conduct a scallop dredging survey in May 1968--you can expect results similar to this report's.

INCIDENTAL CATCHES OF FINFISH IN SEA SCALLOP DREDGES ON GEORGES BANK

By Roland L. Wigley* and Henry W. Jensen*

Finfish are commonly caught in sea scallop dredges on the Georges Bank fishing grounds. This article analyzes the kinds and number of fish caught in 147 samples collected with a standard commercial scallop dredge from the BCF research vessel "Delaware."

Among the 20 kinds of fish caught, skate accounted for 51% of the total catch. Yellowtail flounder ranked second (11%) and squirrel hake third (8%). Sculpin (7%), goosefish (7%), and haddock (5%) were other common parts of catch.

Highest densities of fish (34 per 10,000 square meters) were near western Georges Bank. Intermediate densities (29 per 10,000 square meters) were found in southern Georges Bank. Lowest densities (16 per 10,000 square meters) were in eastern Georges Bank.

The average number of fish caught per individual dredge haul increased from 8 at the slowest speed to 42 at the fastest speed.

It is estimated that the commercial scallop fleet on Georges Bank catches about 20 million finfish per year.

One of New England's major fisheries, and a rapidly growing one in Nova Scotia, is that for sea scallops, Placopecten magellanicus (Gmelin). A fleet of 40 to 60 vessels, based mainly in New Bedford, Mass., has been fishing for scallops for several decades; in recent years, an equal number of vessels from Nova Scotia have sought them (International Commission for the Northwest Atlantic Fisheries, 1964). The principal fishing grounds in the New England-Nova Scotia region is Georges Bank (Merrill and Posgay, 1964). The most heavily fished areas are in water depths between 50 and 100 meters around the bank's periphery. The gear traditionally used is a large steel dredge 3 to 4 meters wide (Posgay, 1957).

During scallop fishing, a wide variety of bottom-dwelling finfishes that abound on the scallop grounds are caught incidentally in the dredge. The more valuable species, such as yellowtail flounder and haddock, sometimes are brought back to port to be sold. But frequently all species are discarded at sea.

This report is a preliminary account of the incidental catch of finfish.

MATERIALS AND METHODS

The Delaware collected the 147 samples of sea scallops and fish during a survey of the Georges Bank sea scallop stocks in May 1961. The collecting gear was a standard commercial scallop dredge (Posgay, 1957) 3.05 meters wide with 5-cm.-diameter rings in the dredge bag. Each haul lasted 10 minutes. The distance the dredge was towed along the sea bottom was measured with an odometer attached to the dredge. Although the time was the same for each haul, the distance traversed

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Note: All statistics are in the appendix to reprint (Separate No. 795) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, Washington, D. C. 20240.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 795

by the dredge varied somewhat due to the effects of water currents and wind on the vessel. To make all tows comparable, the original fish counts were adjusted to a basic area of 10,000 square meters sampled by the dredge. The adjustment factor was based on the distance the dredge was towed, as measured by the odometer. All data in this report refer to the adjusted catch, or to dredge hauls per 10,000 m^2 sampled. Dredge hauls were taken on Georges Bank in a rather narrow depth zone of 51 to 137 meters (fig. 1).

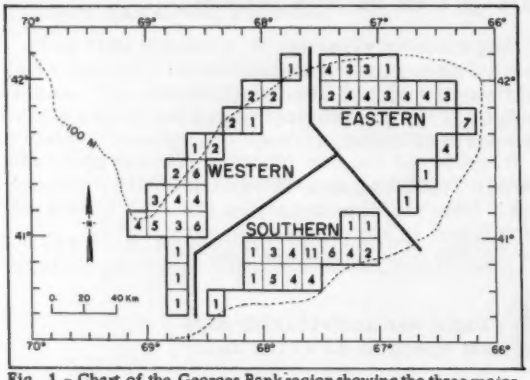

Fig. 1 - Chart of the Georges Bank region showing the three major sectors of the bank (Eastern, Western, and Southern) and the number of dredging stations in each area.

Fish from each dredge haul were identified and counted. Only those longer than about 20 cm. are included in the tabulations. The smaller specimens are omitted, since they were few and were retained in the dredge only accidentally. In reporting these data, we have grouped the samples by the conventional geographical areas (Merrill and Posgay, 1964); dimensions of each unit area are 10 minutes in latitude by 10 minutes in longitude. Samples were taken in 48 areas.

Common names of fishes used in this report are those listed by the American Fisheries Society, Special Publication No. 2, second edition (1960). The scientific and common names are included in table 1 (see note page 63).

KINDS OF FISH AND THEIR RELATIVE DENSITY

Twenty kinds of fish were represented in the collections (table 1). Of these, only 1 was abundant, 5 were common, and 13 were uncommon to rare. The rare species (listed in footnote to table 1) are grouped under "Other." Skate were, by far, the most numerous fish. Their numerical density (number per haul) averaged 14; they accounted for 51% of total number. The second- and third-ranked species were yellowtail flounder and squirrel hake. They averaged 3 and 2 per haul and provided 11% and 8%, respectively. Other fish common in the catch were sculpin, goosefish, and haddock; their average catch-rate ranged from 1 to 2 per haul, and they made up 5% to 7% of total fish caught.

Fish were taken in 140 dredge hauls, 95% of total. The number of specimens per haul averaged 26; the range was 0 to 118 (table 1). The number of fish differed markedly in the 3 sectors (table 1, figs. 2 and 3). Catch was highest in Georges Bank's Western Sector, where the number per haul averaged 34 (unit-area means ranged from 8 to 57). The kinds of fish caught most frequently in this sector were skate, yellowtail flounder, haddock, and goosefish. In the Southern Sector, the catch was moderate, averaging 29 fish per haul (unit-area means ranged from 8 to 51). Principal kinds of fish were skate, squirrel hake, and yellowtail flounder. The Eastern Sector yielded the fewest fish. The number of fish per haul averaged only 16 (unit-area means

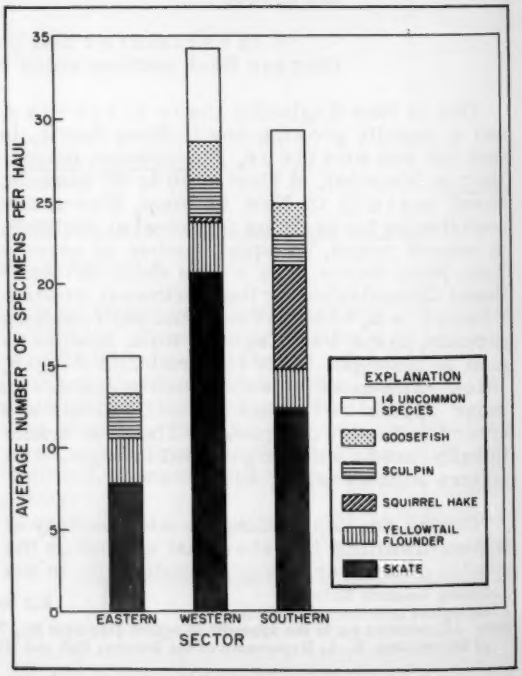

Fig. 2 - Average dredge catch (number per haul) of the major kinds of fishes for each sector of Georges Bank.

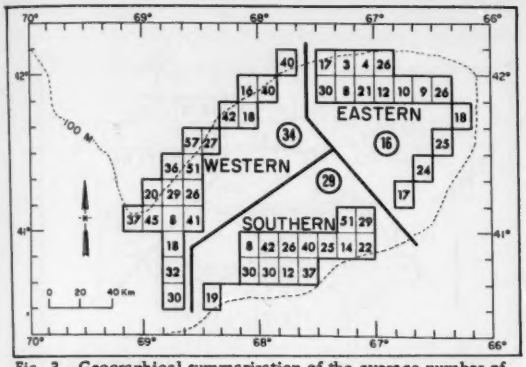

Fig. 3 - Geographical summarization of the average number of fish caught per dredge haul, all species combined. Values in the circles are sector averages; values in the rectangles are unit-area averages.

ranged from 1 to 30); the most abundant kinds were skate, yellowtail flounder, and sculpin.

Although the abundance of certain species of fish may vary from season to season, or year to year, the average catch of all species combined can be expected to remain about the same, seasonally, and from one year to the next. For example, the fish catch in scallop dredges in September 1965, by the "Albatross IV," was very similar in species composition and quantity to those described here for May 1961.

GEOGRAPHIC DISTRIBUTION

Catch records from this series of samples provide a general indication of the geographic distribution of some of the larger, slow-moving, groundfish found in the Georges Bank region. Several kinds of fish represented in the dredge samples are widely distributed over the bank. These wide-ranging fish were frequently the more abundant kinds, such as goosefish, yellowtail flounder, skate, and sculpin (fig. 4). They were common in all 3 sectors. The windowpane was considerably less numerous but also occurred over a large portion of the bank. These fish habitually lie on the sea bottom or partially buried in the bottom sediments. So they are more likely to be caught in the scallop dredge than pelagic species or the more active demersal species.

Twenty percent of the species exhibited a restricted geographic distribution, or a markedly higher density in specific parts of the Georges Bank. Squirrel hake were especially common in the Southern Sector (fig. 5); they were rare or absent in other sectors. Witch flounder, also, were most plentiful in the Southern Sector (fig. 5). Their occurrence there (in May) is in marked contrast to their fall (September-November) distribution, which is limited to deepwater regions north of Georges Bank (Fritz, 1965). Winter flounder were most abundant in the northeastern part of Georges Bank. Haddock were common in the northeast part of the bank and in the Western Sector; they appeared in only a few collections in the Southern Sector. Silver hake were in highest density along the northwestern periphery of Georges Bank. The only other collections of this species were a few in the Southern Sector.

RELATION OF FISH CATCH TO TOWING SPEED

Speeds at which the dredge was towed were calculated by dividing the distance traveled (odometer measurements) by towing time (10 minutes for each haul). Towing speeds ranged from 1.4 to 4.6 knots; the majority were 3.0 to 3.8 knots.

Towing speeds were determined to learn whether or not speed significantly influenced the catch of fish. The numbers of fish caught at various speeds indicate a pronounced increase in catch with increased towing speed (table 2--see note on page 63, fig. 6). At 1.4 knots, the average catch was about 8 fish per haul; the catch increased to over 42 fish per haul at 4.6 knots. This increase in catch with increase in speed is regular, except for deviations at the very slow and very fast speeds. These deviations are not due to sampling in unusually deep or shallow waters, or the result of fishing on a particular type of bottom. The best explanation is the inadequate number of dredge hauls at the slower and faster speeds. Also, the relatively small number of flatfish, gadoids, and goosefish taken at towing speeds over 4 knots (see fig. 7), and differences in density of fish among the 3 sectors of the bank, contribute to the variations in catch rate.

Catch rate of the different kinds of fish varied considerably with dredge towing speed. The rate of capture of skate, most commonly caught, more than doubled when towing speed was increased from 2 to 3 knots (table 3--see note on page 63, fig. 7). At faster speeds their number continued to increase, leveling off at 16 to 17 per haul at speeds of $3\frac{1}{2}$ to $4\frac{1}{2}$ knots. Time of day had no significant influence on the catch of skate--it was nearly the same at all hours of day and night. Gadoids

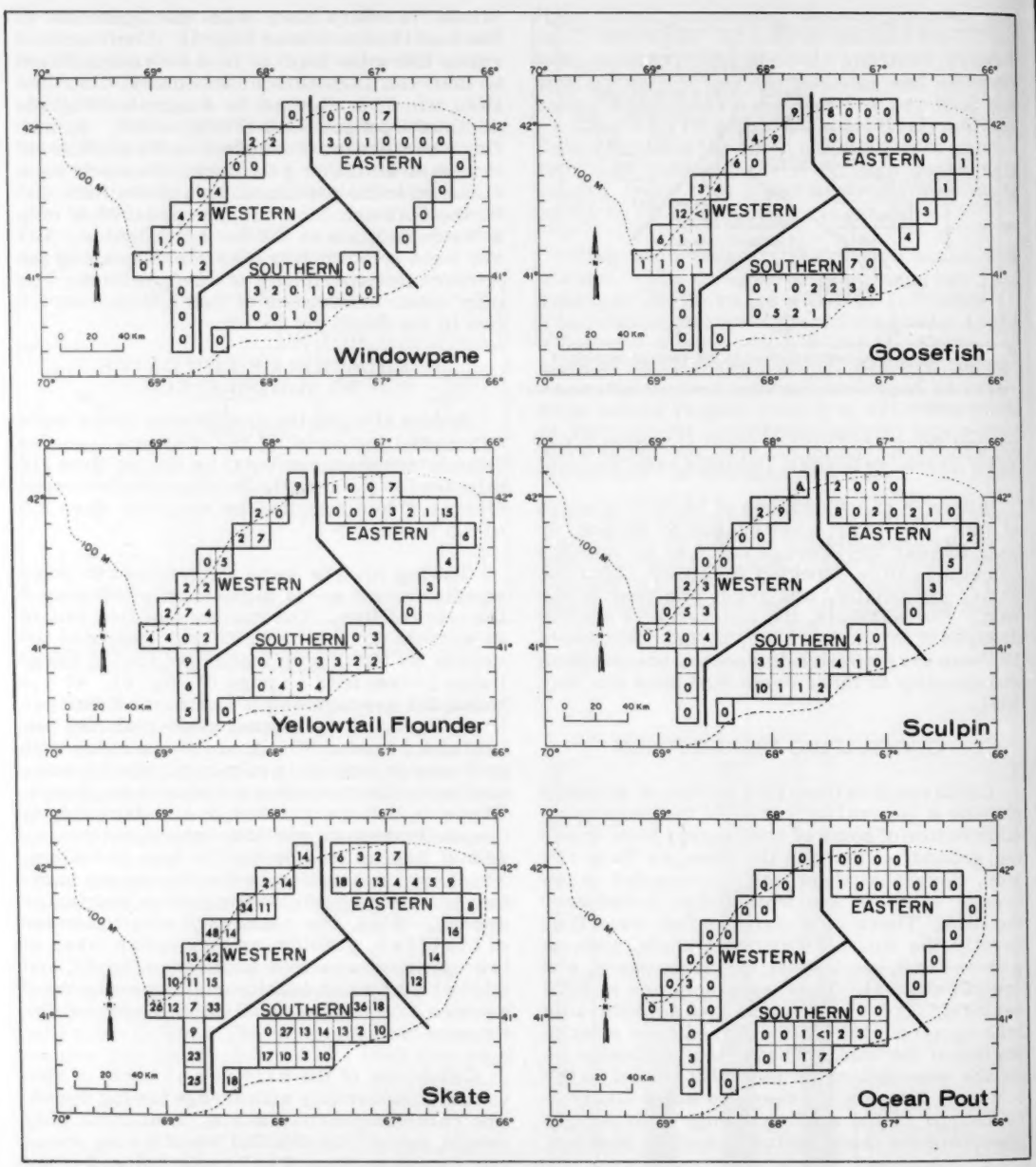

Fig. 4 - Geographic distribution and relative density of the more common finfish caught by scallop dredges on Georges Bank. The value given for each unit area is the average number of specimens per dredge haul.

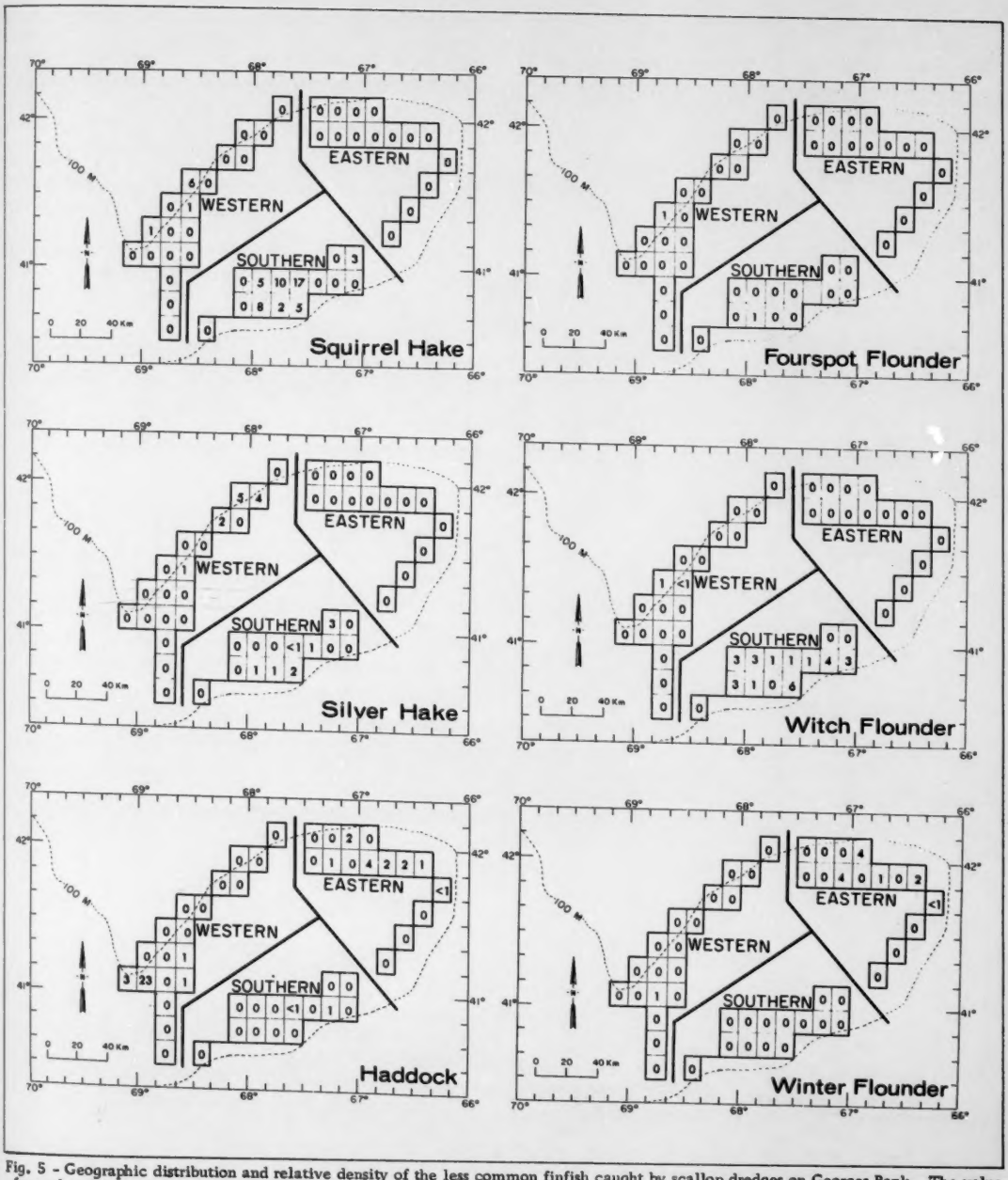

Fig. 5 - Geographic distribution and relative density of the less common finfish caught by scallop dredges on Georges Bank. The value for each unit area is the average number of specimens per dredge haul.

exhibited a similar trend in catch at different towing speeds. Maximum average catch was slightly more than 5 per haul at $3\frac{1}{2}$ knots, but the catch declined at faster towing speeds. Catch rate of flatfish was relatively high (1 to 2 per haul) at slow speeds (2 knots), and reached a maximum of 4 to 5 per haul at 3 to $3\frac{1}{2}$ knots. At faster speeds, the catch of flatfish dropped substantially. Goosefish were caught at a broad range of towing speeds, and revealed relatively small changes in catch rate. Highest average catch of goosefish (2.3 per haul) was at $3\frac{1}{2}$ knots; smallest number was at towing speeds greater than 4 knots. Sculpin was the only common fish taken in largest quantities at speeds greater than 4 knots. Single specimens, however, of Atlantic herring, Atlantic wolffish, and spiny dogfish (all included in the category "Other") were caught only at speeds over 4 knots. Fourspot flounder, oceanpout, sea raven, Atlantic cod, northern searobin, and lumpfish were caught in small numbers only, and at various speeds over $2\frac{1}{2}$ knots.

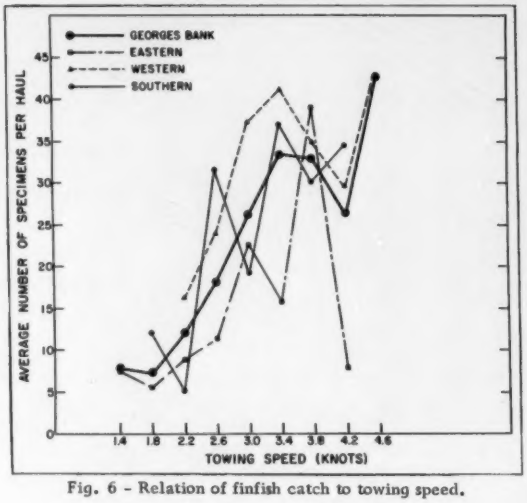

Fig. 6 - Relation of finfish catch to towing speed.

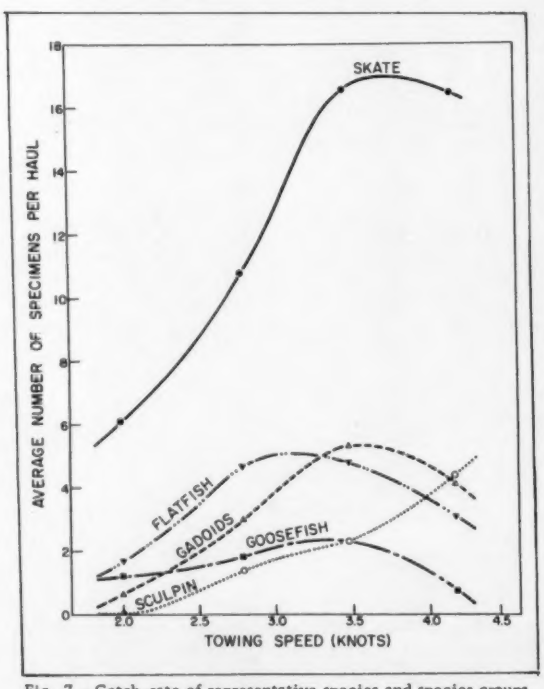

Fig. 7 - Catch-rate of representative species and species groups in relation to towing speed.

Several causes are believed to contribute to these differences in catch rate. The reduced catch of flatfish at the higher speeds may be attributed to bouncing of the dredge off bottom, or the overriding of some specimens where the bottom is uneven. Many flatfishes and skates lie partially buried in bottom sediments; a bouncing dredge or a sweep-chain in high position part of the time could pass over some slower-moving specimens of these species. The increased catch of all finfish at medium or high towing speed, compared to their low catch at low speed, may be due to the fish's inability to escape the oncoming dredge--which they are able to do when the dredge is towed slower than $2\frac{1}{2}$ knots. Vibrations produced by the pounding of dredge against the ocean bottom, and turbulence created by the towing warp and dredge passing through water, undoubtedly are sensed to some degree by the various kinds of fish. Differences in ability to detect sounds and vibrations through the water and ocean bottom, combined with unequal visual acuity and a wide range in fright reaction of these fishes, may explain a major part of the disparity in catch rate and changes of catch rate with towing speed among the various kinds of fish.

ESTIMATES OF FINFISH CAUGHT BY COMMERCIAL SCALLOP FLEET

In this section, we present preliminary estimates of the finfish caught on Georges

Bank by the New England-Nova Scotian commercial scallopers. We assume that the finfish catch for commercial vessels is about the same as the Delaware's. Fishing effort by the New England-Nova Scotian scallop fleet for the 5-year period 1959-63 was used to derive an estimate of annual fishing effort (Power, 1961-1963; Power and Lyles, 1964; Lyles, 1965; Neil Bourne, personal communication).

We have pointed out that the species composition and density of fishes vary from one sector of Georges Bank to another. Also, the amount of fishing by the commercial scallop fleet differs from sector to sector. Appropriate adjustments were made to correct for these variables before applying the catch data obtained by the Delaware to the annual average fishing effort by the scallop fleet. Annual fishing effort (number of vessel-days fished) by the commercial fleet in the three sectors was: Eastern--7,796 days; Western--1,821 days; and Southern--2,436 days. The estimated catch of fish is listed in table 4--see note on page 63.

We estimate that over 20 million finfish are caught annually by the scallop fleet on Georges Bank. Skate make up a major portion (50%) of this catch (fig. 8) and account for over 10 million fish. The commercial value of skate is so low that they are usually discarded. Other low-value fish in the catch are sculpin, goosefish, squirrel hake, silver hake, and "Other," which individually account for 0.3 to 1.8 million specimens, and collectively account for over 5.4 million--26% of the total. The commercially valuable species are yellowtail flounder, other flatfish, and haddock. Together, they provide about 24% (5 million) of the total catch. Sometimes, these species are brought back to port by the scallop fishermen for their families or to be sold at dockside.

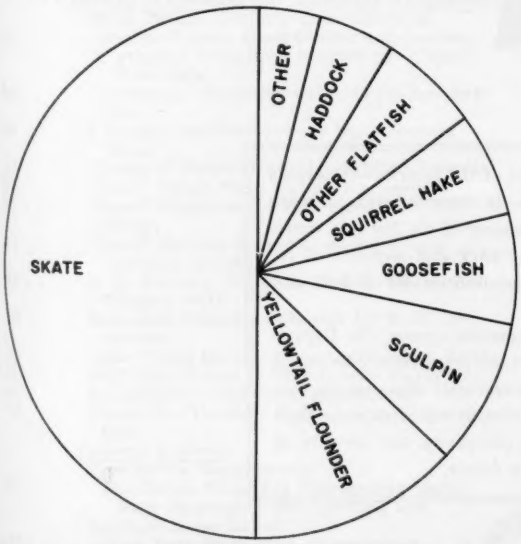

Fig. 8 - Composition of finfish catch (in terms of numbers) made by the commercial scallop fleet on Georges Bank. "Other" includes ocean pout and silver hake; "other flatfish" includes: four-spot flounder, witch flounder, winter flounder, and windowpane.

Gross estimates of the weight of fish caught by the scallop fleet can be obtained from observations on fish size made by personnel aboard the Delaware. They estimated that the weight of individual finfish caught on the survey cruise averaged roughly 0.45 kilogram (ca. 1 pound). Based on this approximation, the scallop fleet catch is estimated to be 9 million kilograms (20 million pounds) of finfish each year.

Finfish, plus about 27 million kilograms (60 million pounds) of scallop viscera per year (J. A. Posgay, personal communication), discarded on the Georges Bank fishing grounds provide a valuable source of nourishment for fish and invertebrates. Relatively minor quantities are eaten by birds and mammals. Large carnivorous fish, such as sharks, cod, and goosefish, engulf whole specimens of the smaller discarded species. The large discarded fish are attacked piecemeal by fish and certain kinds of invertebrates. Crabs, shrimp, gastropod mollusks, isopods, amphipods, and numerous other groups of invertebrates use this animal matter to supplement their normal food sources.

Animal matter discarded at sea by the sea scallop fleet has short-circuited some pathways in the normal food web. Consequently, the slow-moving, scavenger-type fishes (demersal sharks, skate, goosefish, and others) may have benefited greatly from this additional food supply, whereas the fast-swimming predaceous fish (pollock, mackerel, and others) may have profited rather little. Possibly, the large quantities of food material dumped on the fishing grounds over many decades has contributed to changing the species composition of the animal populations in the heavily fished areas of Georges Bank.

ACKNOWLEDGMENTS

Information for this study was collected from aboard the BCF research vessel Delaware. Arthur S. Merrill was Chief Scientist, assisted by John R. Donovan, Henry W. Jensen, Samuel R. Nickerson, and Llewellyn R. Porter, Jr. J. Arthur Posgay read the original manuscript and offered suggestions for its improvement.

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Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

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WIN A SPECIAL BADGE WITH GERMAN TUNA POTATO SALAD

You may have to call the cops to keep order when your dinner crowd gets a whiff of this savory German Tuna Potato Salad. Its tart flavor will put the bite on the guests' appetites and won't release them for any amount of bail.

Blend tuna with this traditional salad for a special badge of seafood savor. It will have everyone jumping into the paddy wagon and riding from the far end of the neighborhood to reach your table.

Large tuna chunks add a bountiful, high-protein meat content to the tangy, sweet-sour favorite and give this budget beater an extra helping of body and color. Tuna muscles in with an entirely new taste takeover. Its special flavor will take dinnertime hungers into custody and handcuff them securely to your table until the entire dish is eaten.

You won't need to turn stool pigeon to spill the tasty secret to admiring gangs. All your friends will be right; no dish this tempting can be jailed in one recipe file for long.

GERMAN TUNA POTATO SALAD

- 2 cans (6½ or 7 ounces each) tuna
- 6 slices bacon, chopped
- ½ cup chopped celery
- ½ cup chopped onion
- 3 tablespoons sugar
- 1 tablespoon flour
- ½ tablespoon paprika
- ¼ teaspoon salt
- ¼ teaspoon celery seed
- 1 cup water
- ½ cup vinegar
- 3 cups sliced cooked potatoes
- Chopped parsley

Drain tuna. Break tuna into large pieces. Fry bacon in a 10 inch fry pan until crisp. Drain on absorbent paper. Cook celery and onion in bacon fat until tender. Combine sugar, flour, paprika, salt, and celery seed. Stir into vegetable mixture. Add water and vinegar gradually and cook until thickened, stirring constantly. Add potatoes, bacon and tuna. Mix lightly. Cover and cook over low heat for 5 to 10 minutes or until hot and bubbly. Sprinkle with parsley. Makes 6 servings.

So give your weary warriors a real reward. When they come in from the daily beat, serve them a taste-bud topper with this zippy tuna potato salad. You will seen have a captive audience. But don't run short; you could be guilty of inciting a dinnertime riot.

The latest methods for purchasing, handling, storing, and preparing fish are included in the new, 60-page, complete guide to fish cookery, "Let's Cook Fish." This valuable, full-color reference and recipe book is available by sending 60¢ to the Superintendent of Documents, Washington, D. C. 20240.

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AUGUST: outdoor fish cookery month

The United States Department of the Interior's Bureau of Commercial Fisheries is conducting a nation-wide, outdoor fish cookery campaign for the summer months. The purpose of the campaign is to promote greater use of fish and shellfish by increased consumer awareness and to assist the fishing industry in marketing traditionally larger summer supplies.

The following materials were developed specifically for this promotion:

Recipes, press releases, black and white photographs, and color transparencies for metropolitan and suburban newspapers.

A merchandising flyer and advertising inserts for retail stores to use in advertising and in-store displays.

An 8-page brochure for use by Home Demonstration Agents, County Home Economics Supervisors, and 4-H Club Leaders and Supervisors.

More than 250,000 copies of a 16-recipe outdoor fish cookery folder for distribution by field stations throughout the United States.

Public service demonstrations for radio and television.

Cooperating with the Bureau in this promotion are the National Fisheries Institute, members of food and allied industries, chain and independent retail grocers, and manufacturers of outdoor cooking equipment. The United States Department of Agriculture is listing fish fillets and steaks on their July "List of Foods in Plentiful Supply." Many other groups will be working with the Bureau in this far-reaching program.